(No Model.) 3 Sheets—Sheet 1.

J. & M. G. F. BUCKLEY.

MACHINE FOR BENDING BRIDLE IRONS.

No. 441,929. Patented Dec. 2, 1890.

Fig. 1.

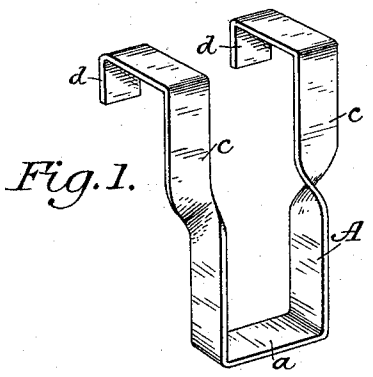
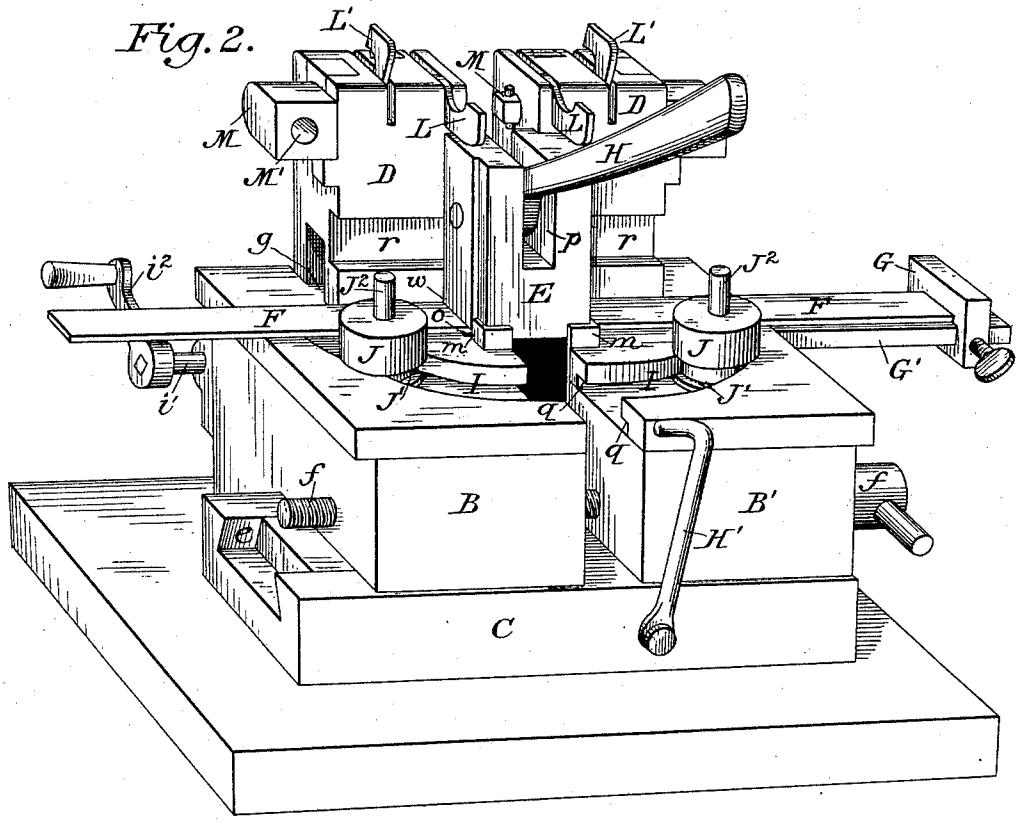


Fig. 2.



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Fig. 3.

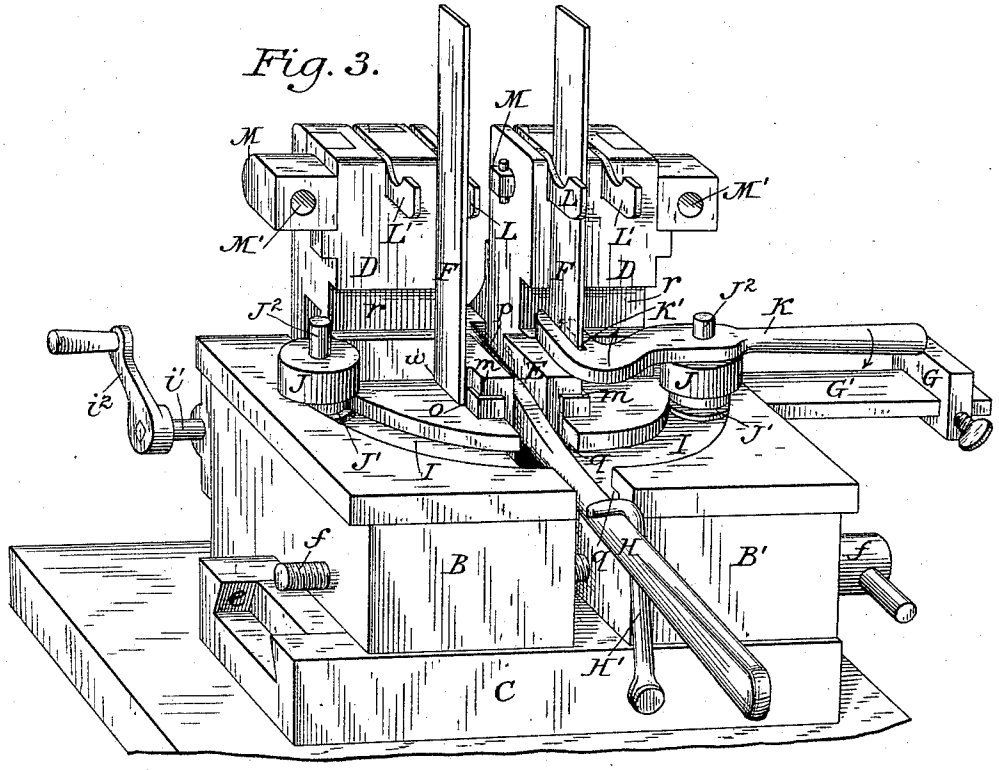
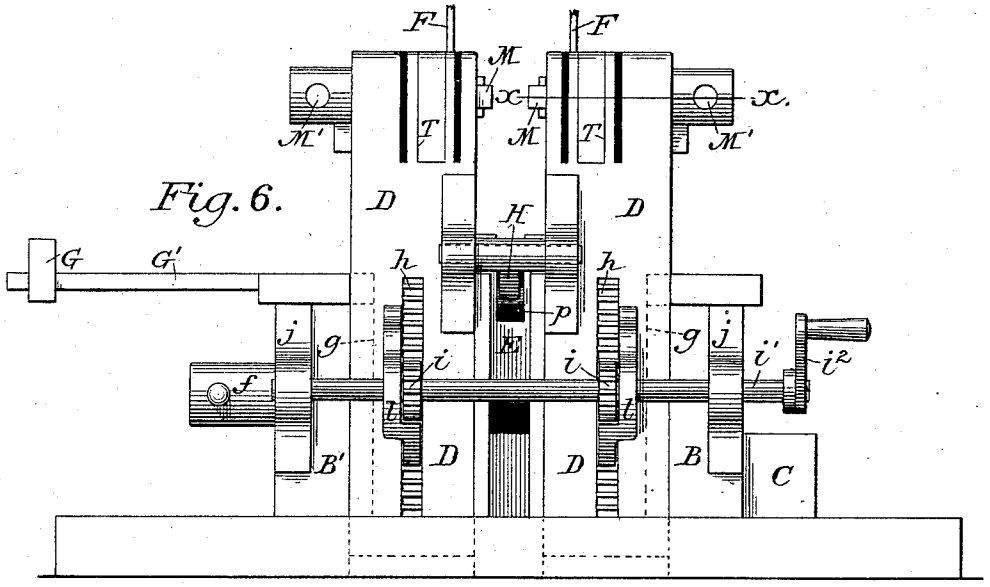


Fig. 6.



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Fig. 4.

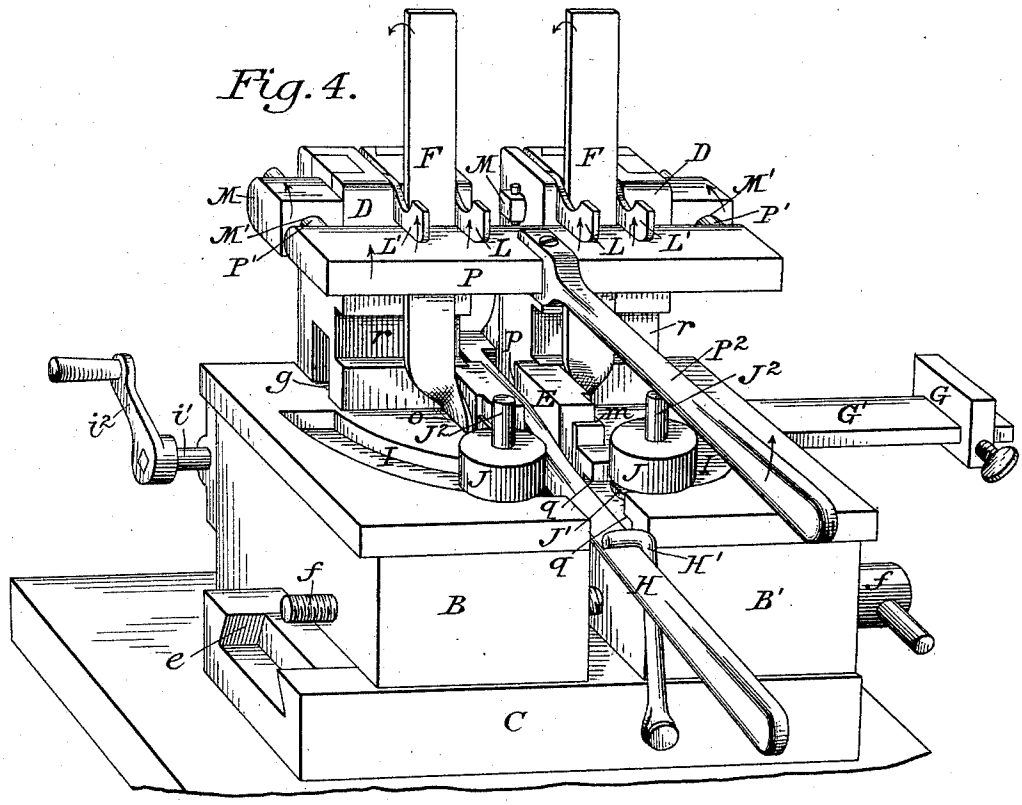


Fig. 7.

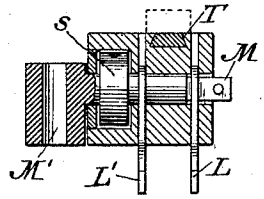


Fig. 5.

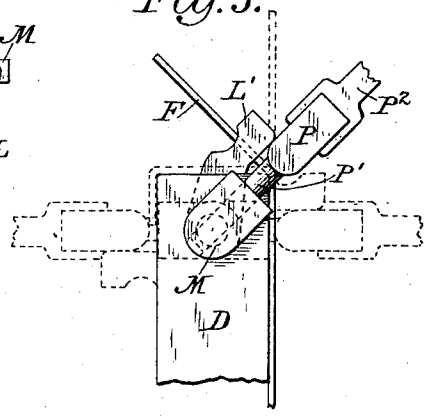
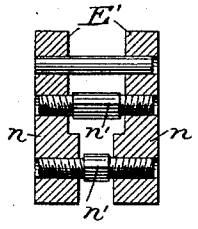


Fig. 8.



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UNITED STATES PATENT OFFICE.

JEREMIAH BUCKLEY AND MICHAEL G. F. BUCKLEY, OF NEW YORK, N. Y.

MACHINE FOR BENDING BRIDLE-IRONS.

SPECIFICATION forming part of Letters Patent No. 441,929, dated December 2, 1890.

Application filed September 22, 1890. Serial No. 365,762. (No model.)

To all whom it may concern:

Be it known that we, JEREMIAH BUCKLEY and MICHAEL G. F. BUCKLEY, both of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Bending Bridle-Irons; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

Our invention relates to mechanism for the manufacture of the stirrup or bridle irons commonly used for the support of beams and joists in the construction of buildings. It has for its object to reduce the cost of their manufacture by the combination, in one machine, of simple and effective devices adapted to readily bend and twist the iron into shape; and it consists in the novel construction and combination of mechanism for said purpose hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a view in perspective of a finished bridle-iron such as is manufactured by the use of our improved machine. Fig. 2 is a view in perspective of the machine, showing an iron blank for the bridle-iron inserted in position in readiness to be operated upon. Fig. 3 is a similar view illustrating the use in the machine of the twisting-lever, by which the iron is twisted as required, the iron being represented as bent up in readiness for said operation. Fig. 4 is a similar view illustrating the use in the machine of the folding-lever by which the ends of the twisted iron are bent over to form its terminal hooks. Fig. 5 is a side elevation of the upper portion of the machine, illustrating the movement of the folding-lever in completing the formation of the bridle-iron. Fig. 6 is a rear view of the machine, illustrating the mechanism by which it is adjusted to the manufacture of different lengths of bridle-irons. Fig. 7 is a detail section in line $x\,x$ of Fig. 6, illustrating the spring-actuated shaft carrying the swinging steadying-plates; and Fig. 8, a detail in sectional elevation of a modification in the construction of the forming-block, whereby it is made adjustable in width.

Similar letters indicate corresponding parts in all of the figures.

In the accompanying drawings, A, Fig. 1, represents a "stirrup-iron" or "bridle-iron" constructed of a flat strip of iron bent into proper form by means of our machine, a being the base thereof; $c\,c$, its lateral shank, and $d\,d$ its hooks, the shanks $c\,c$ being both twisted to bring the hooks in a plane at right angles with the base.

B B′ are base-blocks, one of which B is fitted to move to and from the other in a dovetailed recess e, formed in the bed-plate C, upon which said blocks are mounted. The movement of the block B is effected and its adjustment controlled by means of a screw f working loosely through the fixed block B′, parallel with the bed-plate C, and screwing into the adjustable block B.

Standing-blocks D D are fitted to move vertically in recesses cut out in the inner rear corners of the base-blocks B B′, being guided and supported by tongues $g\,g$, projecting from each base-block into longitudinal grooves in the standing-block, as represented by dotted lines in Fig. 6. These standing-blocks are both adjustable in height, each by means of a rack h on its rear outer face meshing with a pinion i on a transverse shaft i', journaled in suitable brackets $j\,j$ secured to the rear face of the base-block and operated by a crank i^2, as shown in Fig. 6, and they are supported when adjusted by means of dogs $l\,l$, pivoted to swing upon the shaft i' into engagement at their lower ends with the notches in the racks $h\,h$. The adjustment of these standing-blocks D D determines the length of the shanks $c\,c$ of the bridle-arm, (see Fig. 1,) and the length of the base a of the iron is determined by the width of the opening left between the base-blocks B B′.

A forming-block E is fitted to move freely vertically in the opening between the base-blocks B B′ immediately in front of and in contact with the standing-blocks D D, being made to fit in guideways $m\,m$ formed to receive it in the opposite inner faces of the two base-blocks.

A set of forming-blocks E, of different widths, adapted to conform to the standard

lengths of the base in bridle-irons of different sizes, may be used interchangeably with the machine, the base-blocks B B′ being adjusted to each, as required; or a single adjustable forming-block E′ (see Fig. 8) may be used, said block being vertically divided into two sections *n n*, united by transverse adjusting-screws *n′*, to admit of a change in the width thereof in conformity to the required length of base *a* for the bridle-iron.

The forming-block E admits of being raised in its ways *m m* until its lower end is above the level of the top of the base-blocks B B′, so that the strip of iron or blank F of which the stirrup or bridle-iron is to be formed may be laid horizontally flatwise upon the base-blocks to extend under the forming-block across the opening between them. The middle of the blank-strip F is placed immediately under the forming-block E, its position being gaged by means of a gage-block G, mounted to slide on an arm G′, extending in a right line with the strip outwardly from the fixed base-block B′.

A central recess *p* is formed in the top of the forming-block E parallel with the length of the opening between the base-blocks B B′, and a lever H, pivoted at the rear of the standing-blocks D D, is made to swing forward between the standing-blocks and to extend through said recess so as to project horizontally at the front of the machine and bear upon a pin fitted transversely in the recess. By means of this lever H pressure is brought to bear upon the forming-block E sufficient to cause it to bend and force the iron strip or blank F centrally down into the space between the base-blocks B B′, the proximate faces of said blocks being recessed at this point (see at *o*, Fig. 3) sufficiently to admit the thickness of the iron between the base-block and forming-block on each side of the latter. By this means the two rectangular bends at each end of the base *a* of the iron strip are readily produced. After the blank has thus received its first bends the lever H is made fast by means of a hook H′, pivoted to the base C, to swing over the end of the lever at the front of the machine, as shown in Figs. 2, 3, and 4.

A flat steadying-plate L is pivoted to oscillate vertically edgewise in a slot in the upper end of each standing-block D, near to its inner end, so as to admit of being swung out to project horizontally from its front face at a right angle therewith, in position to steady and support the upper end of the blank strip F after it has been bent up, as described, and as shown in Fig. 3. This swinging steadying-plate L is attached to a rock-shaft M, mounted centrally in the upper end of each standing-block D, parallel with its front face, so as to turn with said shaft. The shaft is automatically turned so as to carry the plate L to its horizontal position by means of a coiled spring *s*, (shown in Fig. 7,) and its outer end, projecting from the outer end of the standing-block, is enlarged and formed with a socket M′ to receive the end of a lever, by which it may be turned back against the stress of said spring *s*. A second steadying-plate L′, corresponding with the plate L, is pivoted loosely upon the shaft M, to extend out therefrom, parallel with said plate L, through a slot in the upper end of each standing-block, so as to oscillate freely independently of said shaft M and of the plate L. This second plate L′ admits of being swung out to project horizontally from the front face of the standing-block in the same plane as the plate L, and at a distance therefrom corresponding with the width of the strip F, which is to form the bridle-iron, the two plates serving to guide and steady the upper end of the said strip when it is bent up between them, as hereinafter described.

A segmental recess or guideway I, describing an arc having approximately at its center the outer angle *w*, Fig. 2, of the forming-block with the standing-block, is formed in the upper face of each base-block B and B′, the bottom of said guideway being undercut along its entire length on each side thereof, as shown at *q q* in Figs. 2, 3, and 4.

A roller J is fitted to travel freely in each recess or guideway I, the body of the roller being of a diameter slightly less than the width of the guideway, while the diameter of its upper portion, projecting above the surface of the base-plate, is enlarged so as to project over the edges of the guideway. Its lower portion is likewise enlarged in diameter to constitute a flange J′, adapted to enter the under-cut *q q* on each side of the recess, as shown at the left hand in Fig. 3 and at the right in Fig. 4. Each roller J is thus prevented from being lifted out of its guideway, while free to travel back and forth therein the length thereof. A central pin J^2 is fitted to project axially from the top of each roller J to serve as a pivot for a detachable lever K, Fig. 3, whose inner end is so bent as that when the roller is carried to its extreme inner position in the guideway I, as shown in Fig. 3, and the lever is mounted upon the vertical pivot-pin J^2, a slot K′, cut in the end of the lever, shall register with and readily embrace at a point immediately above the forming-block E the proximate upright end of the iron strip or blank F, after it has, by the descent of said forming-block E, been bent up, as described, and as shown in Fig. 3. When the lever K, pivoted upon the axial pin J^2 of the roller J, has thus been made to embrace with its inner slotted end K′ the thickness of the iron strip F, the upper end of the strip may, by swinging the lever to the front so that it shall simultaneously turn upon the pin J^2, be readily bent and twisted until said upper end is brought to a right angle with the lower portion of the strip and parallel with the front face of the proximate standing-block D. A recess *r*, (see Figs. 2, 3, and 4,) cut in the front face of the standing-block D in register with the end of said twisting-lever K, allows room for the play of the end

of the lever as it makes its quarter-turn, and permits the face of the twisted iron to rest closely against the front face of the standing-block D and between the steadying-plates L L′, as shown in Fig. 4 of the drawings.

The ends of the strip or blank F, projecting vertically above the standing-blocks D D, as shown in Fig. 4, are bent back over the tops of the blocks and down again upon the rear face thereof, by means of a transverse detachable bar P, (see Figs. 4 and 5,) provided at each end with pins P′ P′, adapted to fit in the sockets M′ in the outwardly-projecting ends of the two rock-shafts M M, mounted in said standing-blocks. The bar is thus supported transversely across the front face of the standing-blocks against the faces of the upright ends of the strip F, immediately below the steadying-plates L L′, and by reason of its connection with the shafts M M, is free to swing upon said shafts as an axis over the tops of the standing-blocks and in contact therewith from the one side to the other thereof, said movement being illustrated by the dotted lines in Fig. 5. The rotation of the shafts M, produced by the movement of the folding-bar P as it swings from front to rear, carries the inner steadying-plates L L with the bar. The contact of the folding-bar with the outer loose steadying-plates L′ L′ operates to carry them also simultaneously with it, while the bar, bearing in its said movement against the flat faces of the strip F projecting between the two sets of steadying-plates, will bend the strip closely over the top edges and ends of the standing-blocks and thereby produce the double bend in each end of the strip required to form its hooks.

The swinging movement of the folding-bar P is produced by means of a long lever P^2, fitted thereto to project centrally therefrom at a right angle therewith, as shown in Figs. 4 and 5 of the drawings.

To permit of a widening of the standing-blocks for the formation of hooks of different width, dovetailed grooves T T (see Figs. 6 and 7) are formed vertically in the rear face of the upper end of each block, to receive and hold counterpart dovetailed tongues upon blocks of varying width, adapted to be secured thereby to the standing-blocks to increase their width, as illustrated by the dotted lines in Fig. 7.

In the operation of the machine, after the open interval between the base-blocks B B′ has been adjusted in width by means of the screw *f* to conform to the length of base required in the bridle-iron, and the height of the standing-blocks D D has been adjusted by turning the crank i^2 and shaft *i*′ to determine the length of its shanks, the blank F, of which the bridle-iron is to be formed, being first properly heated to admit of being readily worked, is laid flat upon the base-blocks B B′, under the forming-block E and against the standing-blocks D D, and by means of the gage-block G is adjusted so as to bring its middle point centrally over the interval between the base-blocks. The forming-block E is then forced down upon the middle of the blank F by means of the lever H, and the blank is carried down thereby into the open interval until it strikes the bottom thereof, and is thereby bent so that its two ends shall project vertically on each side of the forming-block at a right angle with the middle portion confined under said block. The upright ends, which are to constitute the shank of the bridle-iron, are then, each in succession, caught in the slotted end or jaws of the twisting-lever K, which is pivoted for the purpose on the pin J^2, projecting from the roller J. After the slotted end of the pivoted lever K has been made to engage the blank F the lever is swung around to the front, the roller J moving with it, and the portion of the blank projecting above the face of the base-block B or B′ is thereby twisted until it is brought to a right angle with the portion confined by the forming-block E and parallel with the face of the standing-block D, against which it is closely pressed. Its upper end, after being bent up, is steadied laterally by the steadying-plate L. After both ends of the blank F have thus been twisted to form the shanks of the bridle-iron, as shown in Fig. 4, the outer steadying-plates L′ L′ are swung out to confine the blanks laterally. The pins P′ P′ of the folding-bar P are then inserted in the sockets M′ M′ of the shafts M M, and by means of the lever P^2 said bar is swung completely over the top of the standing-blocks D D, carrying with it the projecting ends of the blank F, confined between the steadying-plates L L′, so as to bend said ends sharply over the upper corners of said blocks upon the tops thereof and down against their rear face, as shown in Fig. 5, thereby forming the hooks for the bridle-iron and completing its manufacture. So soon as the folding-bar is withdrawn from the sockets M′ M′ the shafts M M will be automatically turned back by their springs *s s*, (see Fig. 7,) so as to carry the inner steadying-plates L L back to their first position, as shown in Fig. 2.

We claim as our invention—

1. The combination, in a machine for bending bridle-irons, of the bed-plate, the base-blocks thereon having a forming-interval between them, the standing-blocks projecting above the base-blocks at the rear thereof on each side of said interval, the forming-block dropping vertically in front of said standing-blocks into said opening, and the bending-lever having a suitable fulcrum at its rear end, and which extends forward between the standing-blocks and over the forming-block to bear thereon for its depression, all substantially in the manner and for the purpose herein set forth.

2. The combination, with the base-blocks having a forming interval between them, the standing-blocks on either side of said interval at the rear of the base-blocks, and a form-

ing-block moving vertically in front of the standing-blocks and into the forming interval, of a gage-block moving upon a gage-bar parallel with the front face of the standing-blocks at one side thereof and in a right line therewith, substantially in the manner and for the purpose herein set forth.

3. The combination, in a machine for bending bridle-irons, with the base-blocks having a forming interval between them, the standing-blocks projecting above the base-blocks at the rear end thereof on each side of said interval, and the forming-block moving vertically in front of and against the standing-blocks to drop into said interval, of the vertically-disposed rollers, each moving in a curved way formed in the top of each base-block and describing an arc having substantially the angle formed by the proximate face of the forming-block with the front face of the adjacent standing-block as its center, the axial pin projecting above the roller, and the detachable twisting-lever fitting upon said pin to swing thereon, and whose inner end is bent and slotted substantially as described, all substantially in the manner and for the purpose herein set forth.

4. The combination, in a machine for twisting the shanks of bridle-irons, with a base-block and means, substantially as described, for confining the shank of the iron against one face of said base-block, of a curved guideway formed in the top of the base-block and describing an arc having substantially the proximate angle of the forming-block with the face of the standing-block as its center, a roller having its axis vertically disposed moving in said curved guideway, a pivot-pin projecting axially from the top of the roller, and a twisting-lever fitting upon said pivot-pin to swing thereon and engage edgewise with its inner end, the shank to be twisted, substantially in the manner and for the purpose herein set forth.

5. The combination, in a machine for twisting the shanks of bridle-irons, of a base-block, a curved guideway formed in said base-block and laterally and longitudinally undercut or enlarged at the bottom, a roller fitted to move in said guideway with its axis at a right angle with the bottom thereof, a circumferential flange upon the lower inner end of the roller fitted to extend into the undercut recess in the guideway, and a flange or collar of enlarged diameter upon the upper outer portion of the roller to overlap the edge of the guideway, substantially in the manner and for the purpose herein set forth.

6. The combination, in a machine for bending bridle-irons, with mechanism, substantially as described, for bending and twisting into form the shanks of the iron and for confining the same when twisted, of the vertical standing-blocks, against which the twisted shanks are supported and above which they are made to project, the rock-shafts mounted horizontally in said standing-blocks, the detachable folding-bar extending transversely across the front of the standing-blocks to bear against the faces of the shanks, and having pins projecting at each end thereof into sockets in the outer ends of the rock-shafts, and a lever projecting centrally from the folding-bar at a right angle therewith, substantially in the manner and for the purpose herein set forth.

7. The combination, in a machine for bending bridle-irons, with the standing-blocks over which the shanks are bent to form the hooks, and with the rock-shafts in said standing-blocks, of the steadying-plates attached to said shafts to project and oscillate therewith through slots in the upper ends of the standing-plates, substantially in the manner and for the purpose herein set forth.

8. The combination, with the standing-blocks D D and rock-shafts M M, mounted therein, of the steadying-plates L′ L′, mounted to oscillate loosely upon said shafts in slots formed in the upper ends of the standing-blocks, substantially in the manner and for the purpose herein set forth.

9. The combination, with the standing-blocks D D and rock-shafts M M, mounted therein, of the springs *s s*, actuating said shafts, the steadying-plates L L, attached to said shafts, and the steadying-plates L′ L′, pivoted loosely thereon, said plates being severally made to project through slots in the upper ends of the standing-blocks, substantially in the manner and for the purpose herein set forth.

10. The combination, in a machine for bending bridle-irons, with the base-blocks B B′ and standing-blocks D D, mounted vertically in the rear ends of said base-blocks, of a transverse crank-shaft journaled in bearings at the rear of said base-blocks, a rack formed in the rear face of each standing-block, pinions upon the shaft engaging each rack, and dogs pivoted upon the shaft to swing into and out of engagement with each rack, substantially in the manner and for the purpose herein set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JEREMIAH BUCKLEY.
MICHAEL G. F. BUCKLEY.

Witnesses:
A. N. JESBERA,
E. M. WATSON.