June 10, 1924. 1,496,801

B. WERNER

METAL WORKING MACHINE

Filed June 30, 1922 2 Sheets-Sheet 1

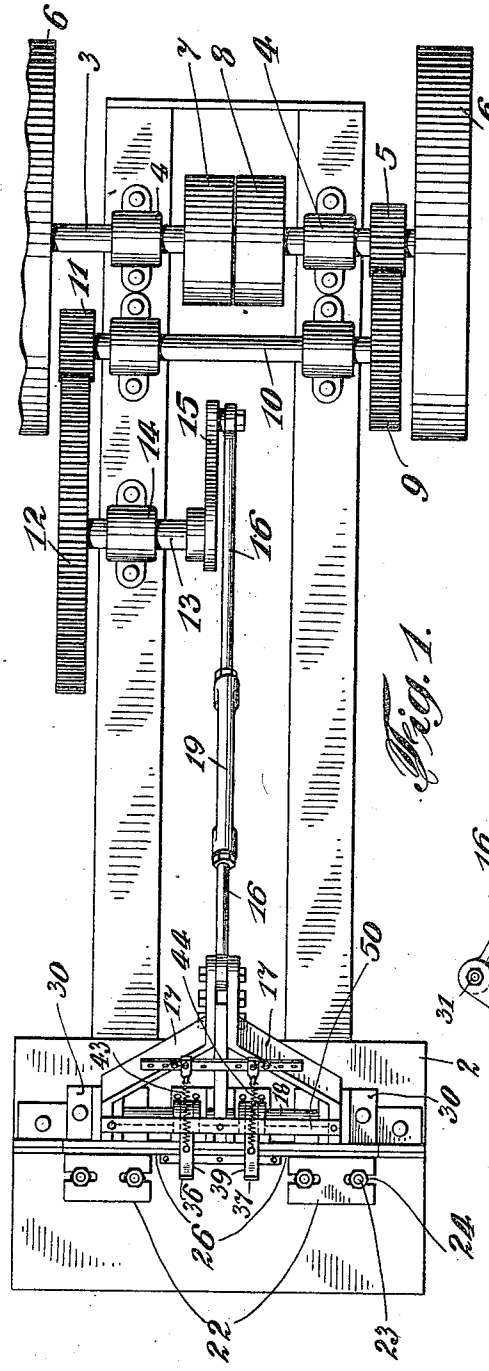


Fig. 1.

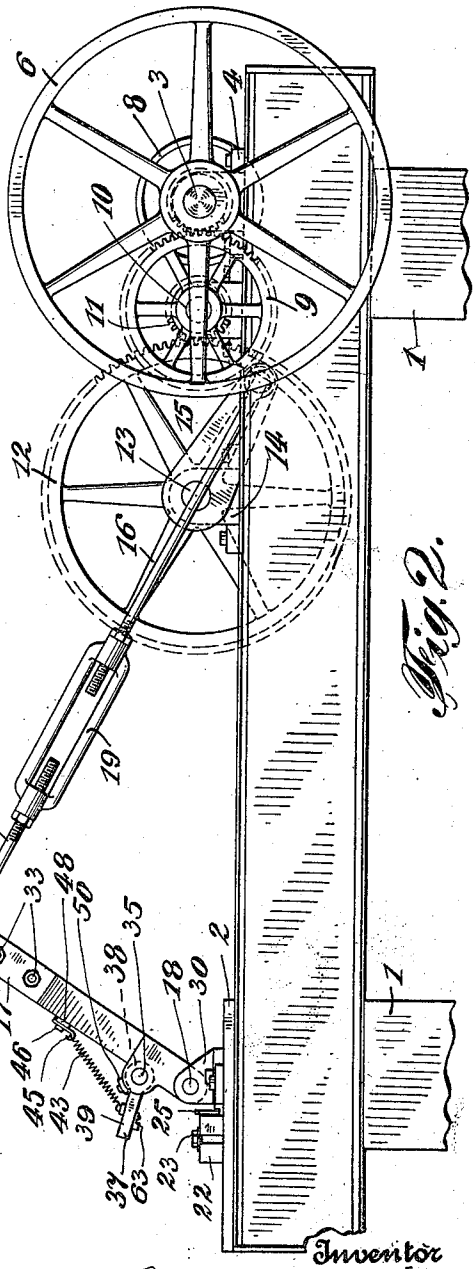


Fig. 2.

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Fig. 3.

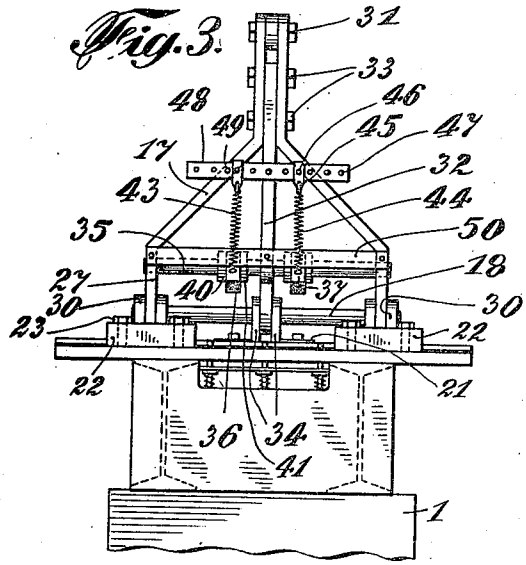


Fig. 4.

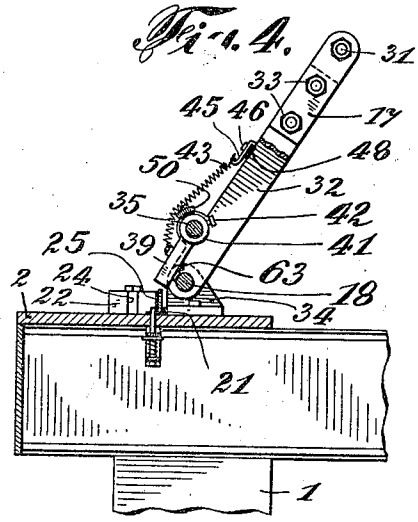


Fig. 5.

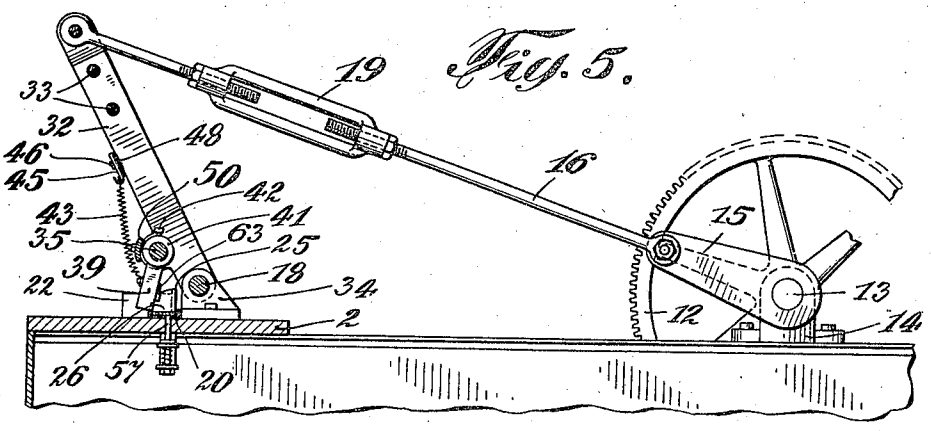


Fig. 7.

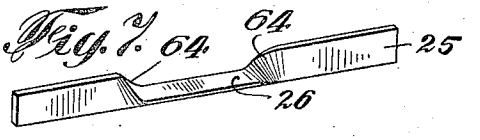
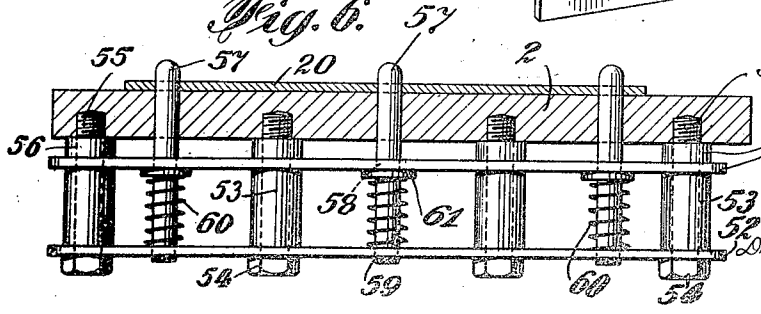


Fig. 6.



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UNITED STATES PATENT OFFICE.

BERNARD WERNER, OF BROOKLYN, NEW YORK, ASSIGNOR TO EVA WERNER, OF NEW YORK, N. Y.

METAL-WORKING MACHINE.

Application filed June 30, 1922. Serial No. 571,896.

To all whom it may concern:

Be it known that I, BERNARD WERNER, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Metal-Working Machines, of which the following is a specification.

My present invention relates primarily to metal twisting machinery and more particularly to machines for twisting a definite portion of the length of a metal bar out of the general plane thereof. The invention has one of many possible applications in the manufacture of the bridle irons or stirrups commonly used as beam supports in the building industry.

It is an object of the invention to provide a reliable machine of the above type which can be readily set or adjusted without sacrifice of rigidity for operating upon a bar to form therein a twisted segment of any selected length.

Another object is to provide a machine of the above type to which the bar to be twisted can be readily, and accurately applied and expeditiously removed after completion of the twisting operation.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown one or more of various possible embodiments of the several features of this invention,

Fig. 1 is a plan view of a preferred form of machine.

Fig. 2 is a side elevation thereof,

Fig. 3 is an end elevation thereof,

Fig. 4 is a fragmentary side view showing the commencement of the twisting operation,

Fig. 5 is a view generally similar to Fig. 4 showing the completion of the twisting operation,

Fig. 6 is a sectional view on an enlarged scale showing the holding and stripping plungers, and;

Fig. 7 is a perspective view of the product of the machine.

Referring to the drawings, I have shown a metal twisting machine including standards 1 carrying a bed 2 upon which is journaled a drive shaft 3 mounted in bearings 4 and having flywheels 6 at the opposite ends. Shaft 3 is driven from a tight pulley 7 thereon, the usual loose pulley being shown at 8. The drive shaft 3 has a gear 5 at one side meshing with gear 9 upon countershaft 10 which has at its opposite end a pinion 11 meshing with a gear 12 mounted on a stud shaft 13 in bearing 14. The shaft 13 carries a crank arm 15 to which is pivoted the pitman 16, the opposite end of which is pivoted to the oscillatory operating lever or yoke 17 which, in turn, is pivoted about a fixed pivot rod 18 carried in standards 30 upon the bed 2 of the machine, the yoke being retained by the ears of said standards against shifting laterally along the pivot rod. The pitman 16 includes a turn-buckle 19 of usual construction by which its length can be adjusted.

Upon the bed 2 is mounted a backing plate 20 having a short upstanding flange 21 and in front of said backing plate and near opposite ends thereof are mounted blocks 22 clamped to the bed by bolts 23 extending through elongated slots 24 in the edges of the blocks for permitting adjustment thereof. The bar 25 to be twisted is retained with its face vertical between the blocks and the backing plate with a portion 26 of the length thereof exposed between the blocks.

The upper end or stem of the yoke is clamped by bolts and nuts 31 against opposite sides of the pitman 16, a reinforce bar 32 extending axially of the yoke and being secured between the arms thereof by bolts and nuts 33. The reinforce bar preferably is pivoted at its lower end about pivot rod 18 and is retained by ears 34 upon a standard on the bed against lateral displacement, the rod 18 extending through said ears. Parallel to the pivot rod 18 the cross rod 35 which carries the twisting tools 36 and 37 is mounted upon the yoke, the reinforce bar 32 providing an additional support for the center of said rod. Each twisting lug comprises an eye 38 rotatably fitted over the cross rod 35 and a projecting radial arm, finger or lug 39 and is held in fixed position

lengthwise of the cross rod by collars 40 and 41 clamped to the cross rod by set screws 42. Separate coil springs 43 and 44 are secured to the twisting lugs 36 and 37, the upper ends of said springs being preferably held by hooks 45 retained by bolts 46 in any one of a series of apertures 47 in spring anchor bar 48 secured as at 49 near the stem or upper end of the yoke. A fixed stop bar 50 extends transversely across the yoke to determine the limiting position of the twisting lugs to which they are normally urged by the springs 43 and 44 as best shown in Fig. 2.

For maintaining a straight bar against bowing when originally placed into the machine and for serving as a stripper to facilitate removal of the twisted bar from the machine, I provide the arrangement best shown in Fig. 6. This construction comprises a pair of parallel plates 51 and 52 spaced by sleeves 53, a series of bolts 54 extending through said plates and sleeves to secure the same as at 55 to the lower surface of the bed 2, collars 56 encircling said bolts to space the upper of the plates 51 from the bed. A series of spring-pressed fingers or plungers 57 extend vertically upwardly through the bed plate and through aligned openings 58 and 59 in the plates 51 and 52, coil springs 60 between said plates encircling said fingers and pressing an integral collar 61 on each plunger against upper plate 51 to maintain the plungers in elevated position. The upper ends of the plungers, as best shown in Fig. 1, are aligned with the edge of the blocks 22 to contact the face of the bar 25 to be twisted, when the same is inserted into the machine.

For setting the machine for operation, the twisting lugs 36 and 37 are first placed at the distance corresponding to the length of twisted portion desired. For this purpose, it is merely necessary to loosen the set screws 42 by which the collars 40 and 41 are maintained in position and the lugs are shifted along the length of the cross rod 35 preferably to points equidistant from the reinforce bar 32 and secured in position by again tightening the set screws with collars 40 and 41 close against the lugs in the position of adjustment. It is preferred to maintain the retracting springs 43 and 44 with their lengths substantially at right angles to the length of the cross rod 35 and it will, of course, be apparent that the anchoring ends of said springs may readily be adjusted to substantially such position for any adjustment in the position of the twisting lugs. In every position of adjustment the springs 43 and 44 will, therefore, retract the lugs without substantial binding or jamming tendency.

In operation, the machine being driven continuously from any suitable source of power, the bar 25 to be twisted is inserted between the blocks 22 and the backing plate 21 by hand, the plungers 57 projecting from the machine serving as stops to prevent bowing of the plate in the original application thereof or to compel straightening of said plate, if slightly bowed, prior to application, so as to assure accuracy of application for corresponding accuracy of twisting. Before the operating yoke 17 in the operation of the machine reaches the position shown in Fig. 4, the operator presses manually upon the forward surfaces of the lugs 36 and 37 against the resistance of springs 43 and 44. Stop nuts 63 on the twisting lugs determine the operative setting thereof by contacting the limiting pivot rod 18 as best shown in Fig. 4 for accurately aligning the operating ends of the twisting lugs to perform the twisting operation. As the operation of the machine proceeds, the yoke 17 moves toward and past vertical position and during the operation (see Figs. 4 and 5) the ends 39 of the lugs engage the upper edge of the bar and in the continued rotation thereof exert compression lengthwise of the lugs to force the adjacent and consequently the intermediate part of the edge of the bar 25 in an arc about the lower edge thereof as a center as best seen in Fig. 5. Since the ends of the bar are firmly maintained against distortion by the blocks 22, it will be seen that only the portion of the length of the bar exposed between the blocks is displaced by the twisting lugs, the short lengths between the blocks and the points of engagement of the twisting lugs being distorted into short, generally helical twists 64 to provide (see Fig. 7) the continuous connection between the ends of the bar and the intermediate section 26 thereof at right angles thereto.

The twisting operation set forth takes place against the spring resistance of the projecting plungers 57 which are depressed as the bar section is twisted, as best seen in Fig. 5. When the twisting operation is completed, the operator lets go of the twisting lugs 36 and 37 which are snapped back by springs 43 and 44 to the position shown in Fig. 2 and, as the operating yoke 17 oscillates back toward the right or inactive position, shown in Fig. 2, the expansion of springs 60 causes plungers 57 to elevate the twisted bar from the bed to facilitate manual removal thereof from the machine, and insertion in the manner heretofore described of the next bar to be twisted, before the operating yoke has again returned to the operative position shown in Fig. 4.

The reinforce bar 32 on the yoke renders the construction particularly secure in that it prevents distortion of the yoke 17 and maintains the pivot rod 18 and the cross rod 35 against bowing at the center, where the maximum bending moment occurs, which is

quite substantial when the two twisting lugs are placed close together near the axes of the yoke for providing a short twisted section of bar.

It will thus be seen that there is herein described apparatus in which the several features of this invention are embodied, and which apparatus in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters-Patent of the United States is:—

1. In a metal working machine, in combination, a retaining member for the bar to be twisted, exposing a portion of the length of the bar, a mechanically actuated operating means including a twisting tool, adjustably secured thereto for effecting the twist at any desired distance from the end of the bar, and spring means for automatically displacing the twisting tool out of the path of the work after completion of the twisting operation and independently of the return of the operating means to facilitate access to the twisted piece for removal from the machine.

2. In a metal working machine, in combination, a horizontal bed, a retaining member for maintaining a metal bar to be twisted with its width extending substantially vertical, a continually reciprocating operating member, a twisting tool carried thereby said twisting tool being arranged to move with said operating member in an inclined direction to contact the edge of the vertically extending width of the bar and to twist the same in the continued displacement thereof in an oblique direction and spring means returning said tool to inobtrusive position independently of the return of the operating member.

3. In a twisting machine of the type including a bed, a pair of blocks for holding the ends of a bar to be twisted and exposing a portion between the ends thereof, a pivoted operating lever upon said bed, and a pair of twisting tools upon said lever; the combination in which the twisting arms are pivoted about a cross rod carried by the operating lever and in which means is provided for fixing said arms at any portion lengthwise of said cross rod.

4. In a metal twisting machine, in combination, a bed, means on said bed for supporting a bar to be twisted, an operating yoke pivoted to said bed adjacent said bar supporting means, means for reciprocating said yoke about said pivot, a cross rod carried by said yoke, twisting lugs mounted upon said cross rod to engage the edge of the bar to be twisted and to twist the same as the yoke is moved toward one extremity of its path about the pivot, and means to maintain said twisting lugs against movement longitudinally along said rod from any position of adjustment thereon.

5. In a metal twisting machine, in combination, a bed, a pair of blocks thereon for maintaining a bar to be twisted in fixed position exposing a portion between the ends of said bar, an operating yoke pivoted to said bed adjacent said blocks, means connected to the upper end of said yoke for reciprocating the same about the pivot thereof, a cross rod straddling the arms of said yoke, a pair of twisting lugs pivotally mounted upon said cross rod, spring means to maintain said lugs in inoperative position, and holding means on said cross rod for maintaining said twisting rods in any fixed position of adjustment lengthwise thereof.

6. The combination set forth in claim 5 in which the twisting lugs have eyes encircling the cross rod and in which stop collars encircle said cross rod at opposite sides of each twisting rod and are adjustably clamped in position upon said rod to maintain the twisting lugs in any fixed position of adjustment along the length of the rod to adapt the machine for forming a twisted portion of any desired length.

7. In a metal twisting machine, in combination, an oscillating operating structure, a pair of twisting lugs carried thereby to engage and twist a bar to be worked, said operating structure including a cross rod parallel to the length of the work, said lugs being adjustable lengthwise of said cross rod, and means for fixing said lugs against undesired displacement from any position of adjustment, whereby any desired length of the bar may be twisted.

8. In a metal twisting machine, in combination, an operating member having a pair of spaced arms rigidly connected to each other, means for oscillating said spaced arms, a cross rod connected to said spaced arms, a pair of twisting lugs mounted upon said cross rod and adjustable lengthwise thereof to increase or decrease the distance therebetween, means to maintain said arms in fixed position lengthwise of said rod, spring means connected to said lugs to maintain the same normally in inoperative position, spring anchoring means carried by said operating structure, affording a plurality of alternative positions for the anchor end of said springs for positioning the same substantially at right angles to said cross rod

for any position of adjustment of said twisting lugs.

9. In a metal twisting machine, in combination, a bed, an oscillatory operating structure mounted thereon, said operating structure including a pivot rod adjacent the work to be twisted, a cross rod carried by said operating structure, said operating structure including a reinforce bar engaging said cross rod at its center for maintaining the same against distortion, twisting lugs mounted upon said cross rod at opposite sides of said reinforce bar, and lock means for fixing said lugs against displacement from any desired position of adjustment along said cross rod.

10. In a metal twisting machine, in combination, a bed, an operating yoke having a pair of diverging arms, a pivot rod therefor upon said bed and adjacent the work to be twisted, a cross rod carried by said yoke, a pair of twisting lugs having eyes encircling said cross rod and adjustable lengthwise thereof, and clamping collars for fixing said lugs in any position of adjustment lengthwise of said cross rod for effecting a twisted section of selected length.

11. In a metal twisting machine, in combination, a bed, an operating yoke thereon having a pair of diverging arms, a pivot rod therefor upon said bed and adjacent the work to be twisted, a cross rod carried by said yoke, a pair of twisting lugs having eyes encircling said cross rods and adjustable lengthwise thereof, clamping collars for fixing said lugs in any position of adjustment lengthwise of said cross bar for varying the length of section to be twisted, springs connected to said lugs, a spring anchor rod for holding the opposite ends of said spring to normally urge said lugs to inoperative position, and stop means for limiting the retraction of said lugs due to said springs.

12. The combination set forth in claim 11 in which the spring anchor bar affords a plurality of alternative holding positions for the anchored end if said springs.

13. In a metal working machine, in combination, a support, means for retaining a bar of metal to be worked fixed with respect to said support with a portion between the ends thereof exposed, and spring operated means to engage a surface of the exposed portion of said bar to retain it against bowing.

14. In a metal working machine, in combination, a bed, a pair of support blocks thereon for retaining a metal bar in fixed position and exposing a portion therebetween, a backing plate for the work, and fingers spring-pressed through said bed to engage the exposed portion of the bar for maintaining it in contact with said backing plate.

15. In a metal twisting machine, in combination, a bed, a pair of blocks thereon, means to maintain the bar to be worked with its face in a vertical plane against said blocks, exposing a portion thereof between said blocks, and spring-pressed fingers projecting upward from said bed substantially into engagement with the lower edge of the bar.

16. In a metal twisting machine, in combination, a backing plate, spaced blocks adjacent thereto for maintaining a bar to be worked with its face in a vertical plane against said backing plate and with a portion of the length of said bar exposed between said blocks, and spring-pressed fingers extending upward from said bar between said blocks to maintain said bar against bowing.

17. In a metal twisting machine, in combination, means for holding a bar in position, means for twisting a portion of said bar out of the plane thereof, and stripping means in the path of the twisting deflection of the bar to facilitate removal of the twisted bar from the machine, said stripping means engaging a portion of the bar to be twisted to maintain the bar against bowing during the twisting operation.

Signed at New York, in the county of New York and State of New York, this 29th day of June, 1922.

BERNARD WERNER.