W. T. NICHOLS.
Machine for Bending Metal.

No. 210,873. Patented Dec. 17, 1878.

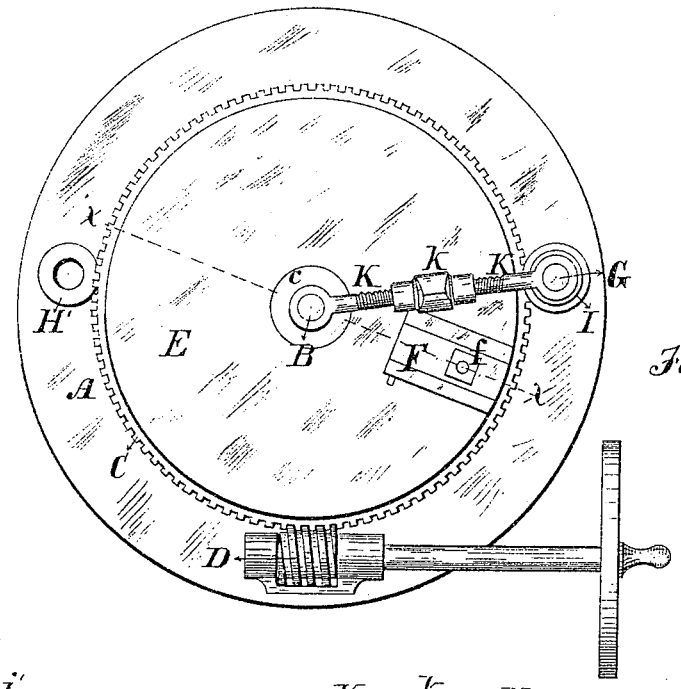

Fig. 1.

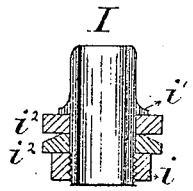

Fig. 4.

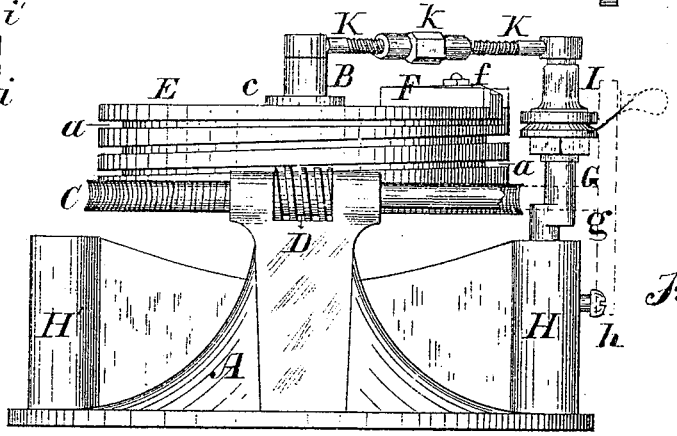

Fig 2

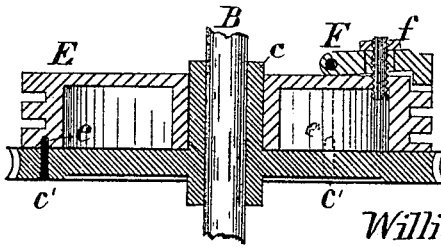

Fig. 3.

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210,873. MACHINES FOR BENDING METAL. William T. Nichols, Chicago, Ill. Filed Jan. 25, 1878.

Brief.—A spiral groove is formed around the former, into which is placed edgewise a metal strip, fastened at one end by the device shown. The outer edge of said strip is made to fit into the groove in the follower, the latter being adapted to slide up and down on an eccentric journal-post. By revolving the former in the manner shown the metal is bent edgewise around it.

Claim.—1. The rotary former E, with circumferential groove *a*, as and for the purpose set forth, in combination with the rotary follower I and the eccentric journal-post G, and a device to hold said journal-post in adjustment, substantially as and for the purpose set forth.

2. The journal-shaft B of the former, in combination with the follower-journal G and the adjustable rigid connecting device K *k*, substantially as and for the purpose set forth.

3. The revolving follower I, composed of the thimble, collars *i*, *i*², and nut *i*', all constructed and arranged substantially as described.

UNITED STATES PATENT OFFICE.

WILLIAM T. NICHOLS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN MACHINES FOR BENDING METAL.

Specification forming part of Letters Patent No. **210,873**, dated December 17, 1878; application filed January 25, 1878.

To all whom it may concern:

Be it known that I, WILLIAM T. NICHOLS, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Bending Metal Edgewise, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of the machine; Fig. 2, an elevation of the same; Fig. 3, a sectional view of the circular bending-die or former, taken on the line *x x*, Fig. 1, and Fig. 4 a sectional view of the follower.

My invention relates to a machine for bending strips or plates of metal into a circular form edgewise, and is adapted especially to the purpose of forming the spiral blades employed in a rotary harrow, for which Letters Patent No. 187,769 were granted to me February 27, 1877, although it is not limited to this use, but may be employed for bending strips or sheets of metal edgewise for any purpose whatever.

My invention consists in mounting the follower upon an eccentric shaft, whereby it may be adjusted to adapt the machine to strips of different width.

It also consists in an adjustable device of special construction for holding the former and follower rigidly in position with each other.

It also consists in the peculiar structure of the revolving follower.

In the drawings, A represents the bed or support of the machine, upon which the operating-posts are mounted, and which is adapted to the particular shape of the former, and is firmly secured in its place.

A shaft or post, B, rises vertically from the central portion of the bed-piece, on which is loosely mounted a large worm-gear wheel, C, with which a worm, D, engages, and by which it is driven, the worm or screw being mounted in suitable bearings on the bed-piece. Upon the upper face of the gear-wheel C is a vertical sleeve, *c*, which constitutes the journal-bearing for a circular die or former, E, which is mounted upon the gear-wheel, and may be turned thereon for adjustment about the sleeve *c*. The former is fastened to the gear-wheels by means of pins *c'* upon the upper face of the latter, which enter corresponding holes *e* in the lower face of the rim of the die. The die or former will be rotated, therefore, by the revolution of the gear-wheel, but may be disengaged therefrom at any time for adjustment, and entirely removed for repairs or any other purpose, whenever desired, by raising it up from off the shaft B. The driving-wheel C may also be removed in the same manner.

It is not necessary to make the former solid; and for the sake of lightness and cheapness I prefer to cut out the central portion thereof on its lower face, so as to give it the shape shown in Fig. 3 of the drawings. In the rim or outer edge of this former a groove, *a*, is cut, which is perpendicular to the axis of the former and deep enough to receive and retain the edge of the strip of metal to be bent. In the drawings this groove is represented as running around the rim of the former spirally, so as to give a spiral twist to the metal at the same time that it is bent edgewise.

My invention is not restricted, however, to this special arrangement of the groove, for it is evident that it may be run straight around the former or in any other direction, according to the particular shape which it is desired the strips should assume when bent.

Upon the upper surface of the former is a pivoted clamp, F, arranged so as to clamp and hold the edge of the strip at the end thereof when placed in the groove at the point of origin of the latter. This clamp is adjusted and secured by means of a bolt and nut, *f*.

A post, G, is mounted in a suitable socket, H, in the bed-piece, and is fastened in position by means of a set-screw, *h*. This post has a bend or crank, *g*, in it, so that the upper portion is eccentric to the lower portion thereof, which enters the socket, and the latter is arranged at the outer edge of the bed-piece, so that the post will stand outside of the gear-wheel and former.

On the upper portion of the post or shaft G a circular follower, I, is loosely mounted, so as to be free to revolve about the post, and at the same time rise and fall thereon. The tubular portion of this follower is provided with a screw-thread on its lower end, on which

is turned a nut, and between this nut *i* and a shoulder, i^1, on the upper part of this tube, are two loose collars, i^2, which are held between the nut and shoulder. The lower collar is beveled, as shown in Fig. 4 of the drawings, so as to leave a space between it and the upper one, which takes the form of a groove around the follower when the parts are adjusted and secured in place, as shown in Fig. 4.

It is evident that the size of this groove may be regulated by adjusting the nut *i* so as to accommodate metal of different thicknesses.

The construction of the post G with the upper part eccentric to the lower or pivotal portion permits the follower to be adjusted horizontally with relation to the grooved former, so as to accommodate strips of different width.

It is necessary that the grooved former and follower should be held in unvarying relation to each other, and to hold them thus rigidly in relation to each other, link-rods K are attached, respectively, to the upper ends of the shaft B and post G, which are fitted for eyes on the ends of the rods, which slip over the tops of the posts. The inner ends of rods are threaded, and to them is fitted a double nut, *k*, by means of which this connecting device may be adjusted to suit the adjustment of the eccentric follower-post; and as the adjustment may be effected with great nicety and the connection is perfectly rigid, whatever the adjustment, there can be no springing between the two upright shafts, and the former and follower are consequently held in unvarying relation to each other.

The operation of this machine is as follows: The metallic strip is fastened to the former by inserting one edge in the groove therein and screwing down the clamp upon the corner in the groove. The other edge is placed in the groove of the follower I, formed by the two collars, and the eccentric-post adjusted so that the follower will fit up snugly against the edge of the strip, the connection K *k* being also adjusted as may be required. The former is then rotated by means of the screw-gearing, heretofore described, so as to carry the strip around with it between the groove *a* and the follower I, by which movement the strip of metal will be bent edgewise into the groove, and at the same time receive a spiral twist, the follower dropping down on its journal as the strip follows the spiral arrangement of the groove shown in the drawings. A socket, H', is also provided for the follower-post on the opposite side of the machine, to accommodate the bending of right and left spirals, which is accomplished by changing the follower from one side of the machine to the other, and changing the former from a right to a left spiral, or vice versa.

As already stated, this machine is not restricted to the construction of spirals. The strip may be bent in form of a true circle by running the groove straight around the former; or it may be given any desired shape by changing the shape of the die and the groove therein, as described.

In bending spirals, the former is, of course, constructed with the rim of sufficient width to suitably space the distance between the several spirals of the groove therein, so that the strips, when bent, will be properly wound for the purpose for which they are intended.

The machine does its work effectively and satisfactorily, and is applicable for various purposes.

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

1. The rotary former E, with circumferential groove *a*, as and for the purpose set forth, in combination with the rotary follower I and the eccentric journal-post G, and a device to hold said journal-post in adjustment, substantially as and for the purpose set forth.

2. The journal-shaft B of the former, in combination with the follower-journal G and the adjustable rigid connecting device K *k*, substantially as and for the purpose set forth.

3. The revolving follower I, composed of the thimble, collars i^2, and nut *i*, all constructed and arranged substantially as described.

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