J. Hale,

Bending Wood,

No. 77,036, Patented Apr. 21, 1868.

Fig. 1

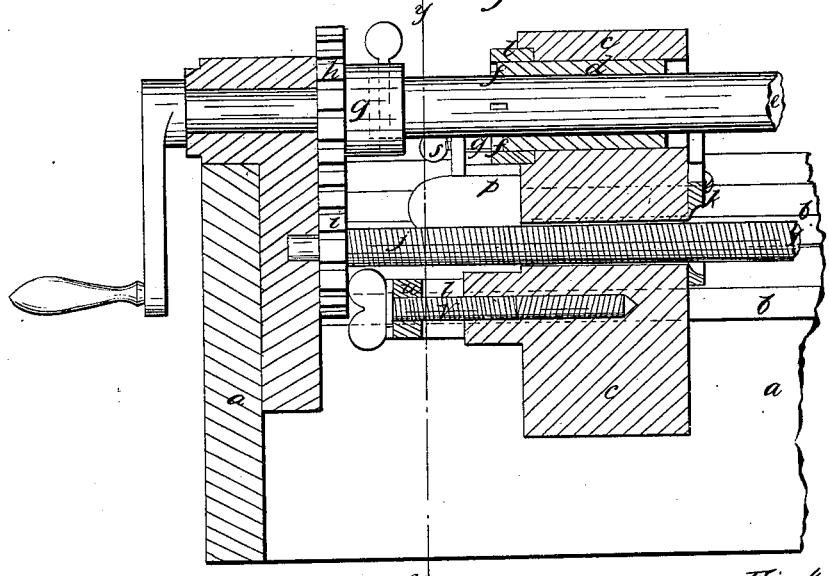


Fig. 3

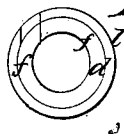


Fig. 2

Fig. 4

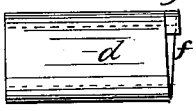
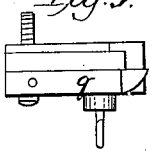


Fig. 5.



Witnesses
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JOSEPH HALE, OF SOMERVILLE, MASSACHUSETTS.

Letters Patent No. 77,036, *dated April* 21, 1868.

IMPROVEMENT IN MACHINES FOR BENDING WOOD.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOSEPH HALE, of Somerville, in the county of Middlesex, and State of Massachusetts, have invented an Improved Machine for Winding Helices; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practise it.

This invention is designed for use in the manufacture of bent wooden washers, patented to me, in the United States, August 27, 1867, under the number 68,624; said invention consisting in the detail of construction and arrangement of a machine for winding helices with their coils in contact with each other.

Figure 1 of the drawings is a sectional elevation of my improved machine, the section being taken in its central vertical longitudinal plane, denoted by line *z z*, (seen in Figure 2,) which is a cross vertical section, taken in the plane of the line *y y*, (seen in fig. 1,) and showing the parts in end elevation beyond.

The frame *a* resembles a lathe-bed, having guides or ways *b*, on which can move a kind of cross-head, *c*. This cross-head contains a tube, *d*, through which passes and in which rotates the winding-arbor *e*. This sleeve is arranged with keys, so that it is prevented from rotating in the cross-head, from which it can be removed, and others can be substituted of different sizes suited to use with different-sized winding-mandrels, and different-sized strips which are to be wound.

One end of this sleeve has an inclined formation, such as is shown in the detail view, Figures 3 and 4; the inclined face *f* being the surface which operates under the rotation of the mandrel *e* to pack the coils of the helices together, and to cause the cross-head *c* to move along the mandrel, leaving behind a helix closely coiled upon the mandrel.

In coiling the helix, a strip of metal, of a width equal to the width of the material to be coiled, is wound with the wooden strip upon the arbor, to prevent splintering of the wood in the operation of winding.

I make use of the steel material used for making hoop-skirts, for the metal strip, so wound with the wooden strip.

The thickness of the tube *d* is equal to the thickness of the wooden strip to be wound, plus the thickness of the metal strip. Then the inclined face of the tube *d* is made as follows:

A slot or groove, which will just receive the end of the wooden strip, with its metal-back strip, is cut into the end of the tube, tangentially to its inner and outer diameters, and then the end of the tube is bevelled or inclined uniformly, so that the inclined surface continues from where the upper outer corner of the strip enters the groove in the tube, around the tube to the diagonal corner of the entered strip, which is its lower inner corner. Then, over the end of the tube *d*, a squarely-turned ring, *l*, is placed, with its face in line with the outer upper corner of the entering-strip. The mandrel *e* is fixed in any suitable chuck, *g*, arranged to be rotated, and provided with a gear, *h*, which meshes into gear *i* fixed on a screw-shaft, *j*, the purpose of which is to draw back the cross-head to its starting-place, near the chuck, previous to starting to wind a new helix; there being on the cross-head nippers *k*, through manipulation of which, connection can be made and broken between the screw and the cross-head.

The wooden strip which is to be wound is marked *m*, and the flat steel strip, which is wound on the outside of the helix, is marked *n*; this metal strip having its end caught into a hole made for the purpose in the mandrel.

In practice, I secure to the cross-head, so as to move with it, a steam-box, in which the wooden pieces to be wound are prepared by steaming, and are drawn forth, in winding, through an opening therein, one end of each strip being caught, as it enters the groove or slot in the tube *d*, between the mandrel and the metal strip *n*. The steam-box is not shown in the drawings, as in itself there is nothing specially novel. The steam-pipe entering it may be of flexible tubing, to permit its movement with the cross-head.

As the strips pass from the steam-box to the winding-mandrel, they pass through a kind of directing-trough, (seen in plan in Figure 5;) said trough being pivoted at *o*, so that, by a cam, *p*, its free end can be swung against the periphery of ring *l*, and can be held there, while the side *q* of the trough is pivoted at *r*, and can be adjusted

by screw *s* so as to press the entering strip against the inclined surface *f* of the tube *d;* the said trough and all the parts therewith connected being, of course, fixed to the cross-head, so as to move therewith.

To pack the sides of the strip closely in a helical coil, it is necessary to produce a friction on the cross-head to prevent it from moving too easily on the ways *b*, as the strip *m* is drawn by rotation of the mandrel *e* against the inclined face *f* of the tube *d*. To produce this friction, I apply to the cross-head, jaws *t*, which can be expanded by the action of incline *u* and screw *v*, so as to cause the jaws to bear more or less firmly against the lower ways *b*.

With a steamed strip entered between the mandrel and the metal strip, and with the screw *j* disconnected from the nippers *k*, and with the proper adjustment of the trough having the movable side *q*, rotation of the mandrel in the proper direction will wind the strip into a helix covered by the metal strip, the inclined face causing longitudinal movement of the cross-head toward the free end of the mandrel, so that, when the cross-head reaches the other end of the frame, it is covered with helically-wound strips of wood, which are covered by helically-wound strips of the metal. The mandrel may then be removed from its chuck *g*, and the tube *d* can be placed in an oven for the wood thereon to dry. A new arbor is placed in the chuck, and its end is entered into the tube *d*, when the nippers *k* are geared into the screw *j*, and, by rotation of said screw, the cross-head is drawn back near to the chuck, and the described operation is repeated.

It is evident that the cross-head may be fixed upon the frame, in which case the winding-mandrel would have an endwise traverse as well as a rotary movement. This modification would, on account of leaving the steam-box stationary with the cross-head instead of moving with it, have advantages and conveniences over allowing the cross-head to move, carrying the steam-box with it.

I claim—

1. In combination with the tube *d* and with the mandrel *e*, when the arrangement is such that the action of the incline of said tube and the rotation of the mandrel cause a relative movement between the said parts, the entering-trough, made adjustable to the diameter of the tube, and to the width of the strip being wound.

2. The adjustable friction-device, combined with the cross-head carrying the inclined-faced tube.

JOSEPH HALE.

Witnesses:

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