2 Sheets—Sheet 1.

G. W. BADGER.

BORING-MACHINE.

No. 170,980. Patented Dec. 14, 1875.

Fig: 1.

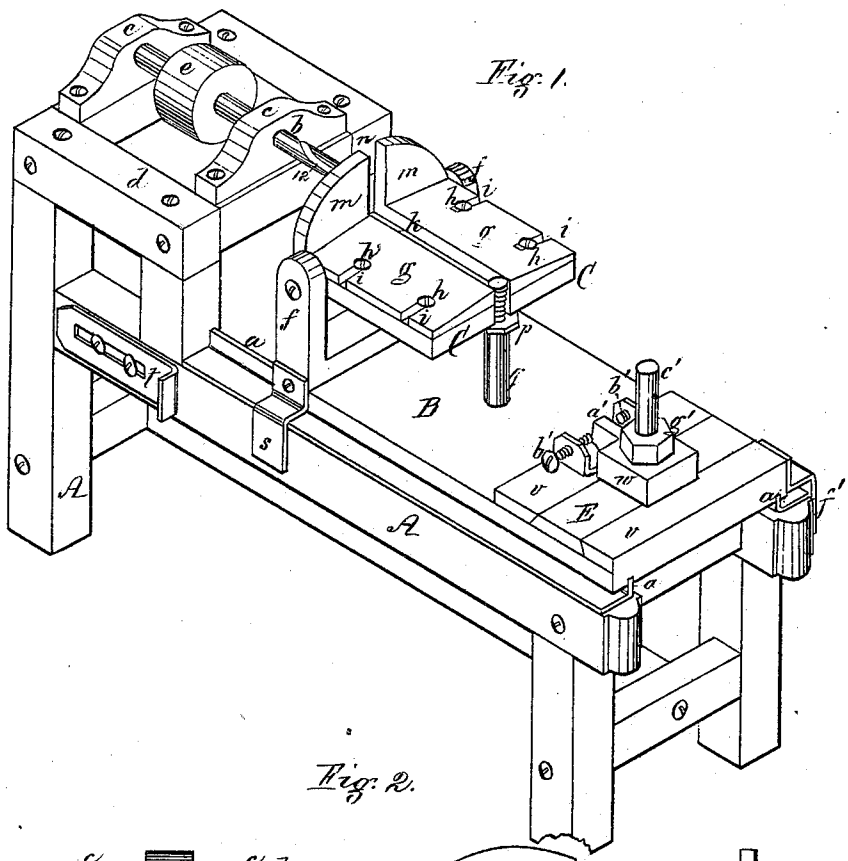
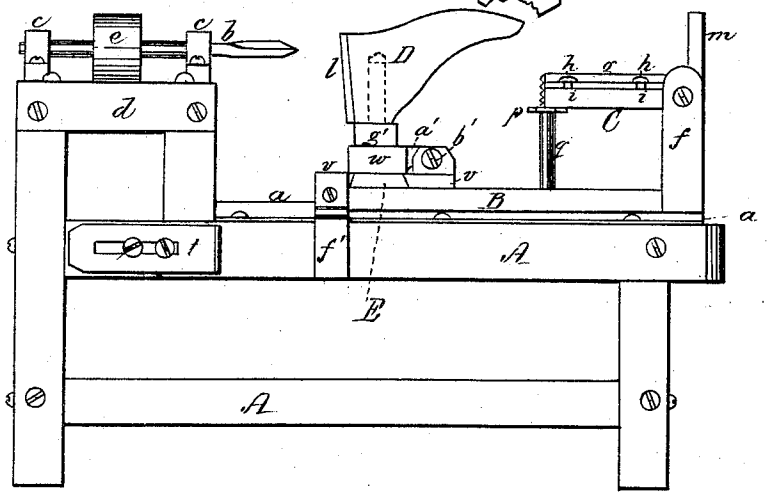


Fig: 2.



Witnesses,
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J. E. Cambridge

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2 Sheets—Sheet 2.

G. W. BADGER.

BORING-MACHINE.

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Fig. 3.

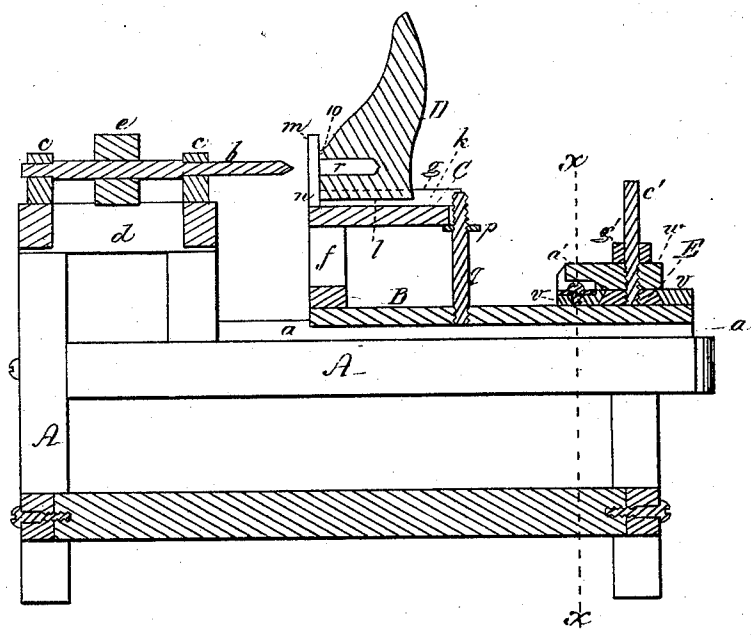


Fig. 4.

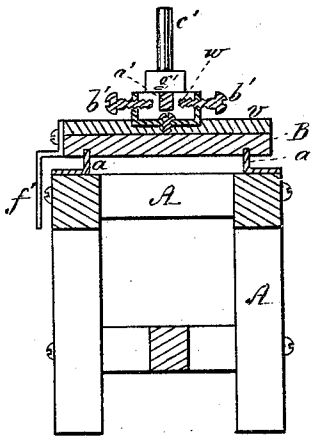


Fig. 5.

Fig. 6.

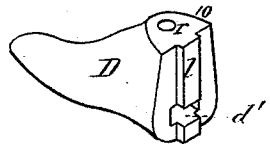
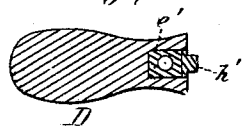


Fig. 7.



Witnesses,
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UNITED STATES PATENT OFFICE.

GEORGE W. BADGER, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO GEORGE P. COX, OF SAME PLACE.

IMPROVEMENT IN BORING-MACHINES.

Specification forming part of Letters Patent No. **170,980**, dated December 14, 1875; application filed October 25, 1875.

To all whom it may concern:

Be it known that I, GEORGE W. BADGER, of Malden, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Boring-Machines, to be used in the construction of boot-trees employed in the manufacture of rubber boots, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a perspective view of my boring-machine. Fig. 2 is a side elevation of the same, the position of the sliding carriage being reversed. Fig. 3 is a longitudinal vertical section through the center of the machine, the parts being in the position seen in Fig. 1, with the foot of the boot-tree in place upon its holder. Fig. 4 is a transverse section on the line *x x* of Fig. 3. Fig. 5 is a transverse section through the boring-bit. Fig. 6 is a perspective view of the foot portion of a boot-tree after being bored by my machine. Fig. 7 is a horizontal section through the same, with its screw-nut in place.

In the manufacture of boot-trees used for rubber boots it becomes necessary to bore a hole in the foot portion for the reception of the lower end of the connecting-bolt, which passes down through the leg portion; and as the inclination of this bolt often varies the hole in each foot-piece must be bored at such an angle as to correspond to, or be in line with, the bolt passing through the particular leg portion intended therefor. This has been accomplished by clamping the foot and leg portions together, and then boring the hole in the foot portion by means of a long auger extending down through the hole previously bored in the leg portion for the passage of the connecting-bolt; but this operation was inconvenient and tedious, and each foot portion required to be especially bored for its own leg portion.

The first part of my invention has for its object to overcome these difficulties, and to enable me to readily bore these holes at the exact angle required, and to the proper depth; and consists in a machine provided with an adjustable holder for the foot portion of the boot-tree, attached to a sliding carriage, in combination with a boring-bit revolving in suitable bearings, the holder, with the foot portion secured thereto, being brought up to the revolving bit, by which means the operation of boring can be readily performed with perfect accuracy and great expedition, a suitable stop or gage being provided for regulating the forward movement of the carriage. My invention also consists in a movable device attached to the carriage for holding the foot portion of the boot-tree up to the bit in a proper position for boring at right angles to the first aperture an aperture for the reception of the screw-nut, through which passes the bolt which connects the leg and foot portions of the tree together. My invention also consists in a boring-bit provided with spiral grooves, one edge of each of which projects out beyond the other, so as to form a cutting-edge, which construction enables the bit to cut laterally when the foot portion of the tree is moved to one side or the other, in order to produce an aperture of a suitable shape for the reception of the nut with which the lower end of the connecting-bolt engages.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the frame-work of the machine, upon ways *a* on the top of which rests a sliding carriage, B. *b* is a horizontal boring-bit, the shaft of which runs in bearings *c*, attached to the top of an elevated portion, *d*, of the frame-work at one end of the machine, the bit being driven by a pulley, *e*, on its shaft, over which passes a belt. (Not shown.) From one end of the carriage B rise two uprights, *f f*, between the upper extremities of which is pivoted, at one end, a holder, C, for supporting the foot portion D of the boot-tree (see Fig. 3) in a proper position to be operated upon by the boring-bit, as will be hereafter more fully explained. To the upper surface of the holder C are secured two plates, *g g*, made adjustable toward and from each other by screws and slots *h i*, so as

to leave a space, *k*, between them, of a width exactly corresponding to that of the tenon *l*, Fig. 6, of the foot D, which fits therein, and the foot is thus centered and prevented from being moved to either side of a line passing longitudinally through the center of the boring-bit, the portion 10 being held firmly by the hand of the operator against a vertical plate or stop, *m*, which rises from the front of the holder, and is provided with a slot, *n*, in line with the bit *b*. The end of the holder C opposite to that which is pivoted to the uprights *f f* rests upon a stop-nut, *p*, made adjustable vertically upon a screw-thread at the upper end of a post, *q*, rising vertically from the carriage B, and by means of this nut the position of the holder C may be regulated so that the foot D will be presented to the boring-bit at the angle required to insure the hole *r*, Fig. 3, being bored exactly in line with the hole in the leg portion of the boot-tree through which the connecting-bolt is to pass. As soon as the foot D has been properly placed upon the holder, as seen in Fig. 3, the carriage B is moved forward by hand on the ways *a*, so as to bring the foot into contact with the bit *b*, which extends through the slot *n*, and this movement of the carriage is continued until a projection, *s*, thereon comes into contact with an adjustable stop, *t*, attached by screws and slots to the side of the frame-work, the stop serving to regulate the degree of penetration of the bit *b*, and the consequent depth of the hole *r*, which necessarily varies, according to the size of the foot. As soon as the hole *r* has been bored the carriage is withdrawn and the foot portion removed from the holder C, when another is substituted, and the operation is repeated until the desired number of foot portions have been bored, and I am thus enabled to bore these holes *r* with great rapidity and perfect accuracy, while the inconvenience of fitting each foot to a particular leg, as heretofore necessary, is avoided. To the end of the carriage B opposite to that to which the holder C is attached is secured, in dovetail ways *v v*, a slide, E, which is capable of a slight movement transversely across the carriage, and to the center of this slide is secured a block, *w*, having a projection, *a'*, which extends out between two regulating-screws, *b' b'*, which pass through the opposite ends of a bent plate attached to one of the ways *v*, these screws serving to limit the motion of the slide E in either direction, for a purpose to be presently explained.

From the center of the block *w* rises a vertical post or rod, *c'*, which enters the hole *r* in the foot D, and serves to hold it up to the bit in a proper position for boring at right angles to the hole *r*, and in such a direction as to intersect it, an aperture, *d'*, Fig. 6, for the reception of the screw-nut *e'*, Fig. 7, through which passes the bolt which connects the leg and foot portions of the boot-tree together.

The operation of boring the holes *r* in the required number of foot portions D having been completed, the carriage B is removed from the ways *a*, and again placed thereon in a reversed position, as seen in Fig. 2, after which each foot is successively placed upon the post *c'*, and the carriage moved forward by hand, so as to bring the foot into contact with the bit *b;* this movement of the carriage being continued until a projection, *f'*, thereon strikes the adjustable stop *t*, by which the depth of the aperture is regulated in accordance with the size of the foot being bored, the aperture *d'* extending slightly beyond the hole *r*, so as to form a seat for the end of the nut *e'*. As the width of the aperture *d'* requires to be greater than the diameter of the boring-bit in order to admit the nut *e'*, it is enlarged to the required size by moving the foot D laterally with the slide E, within the limits allowed by the regulating-screws *b'*, the bit being provided on opposite sides with two spiral grooves, 12, one edge, 13, of each of which projects out slightly beyond the other, as seen in Fig. 5, thus forming cutting-edges, which enable the bit to cut laterally, as well as in the direction of its length, and thus produce an opening corresponding to the width and thickness of the screw-nut, and I am thus enabled to insure the proper position of the screw-nut, so that when in place at the inner end of the aperture made to receive it, as above described, its opening will be exactly in line with the hole *r*, through which the connecting-bolt passes; and as the post *c'* is at all times in a plane at right angles to that of the boring-bit *b*, it is evident that whatever may be the inclination or direction of the hole *r* the aperture *d'* will always be formed at right angles thereto, whereby the engaging of the thread at the lower end of the connecting-bolt with that of the nut is insured—an advantage of great importance, not always secured where the boring has been done by hand, as heretofore.

By adjusting the screws *b'* the width of the aperture *d'* may be varied, as desired, to correspond with the size of the nut employed, and one or more washers, *g'*, may, if required, be placed upon the post *c'*, to raise the foot D to the desired height, which will vary in accordance with its size.

After the nut *e'* has been inserted within the foot it is held in place therein by driving in a wooden plug, *h'*, Fig. 7, and properly securing it in any suitable manner.

By means of the above-described machine I am enabled to form the apertures *r d'* in the foot portion of a boot-tree with great rapidity and with perfect accuracy, so as to insure the proper fitting together of the two portions of the tree, while a great saving is effected in time and labor.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The sliding carriage B, with its pivoted holder C, adjustable stop *p*, adjustable plates

g g, and stop *m*, in combination with a boring-bit and a stop or gage for regulating the forward movement of the carriage, operating substantially in the manner and for the purpose set forth.

2. The adjustable plates *g g* and stop *m*, in combination with the holder C, substantially as and for the purpose described.

3. In combination with the sliding carriage B, an adjustable stop or gage, and a projection for regulating its forward movement, and a boring-bit, the laterally-movable post or holder *c'*, arranged in a plane at right angles to that of the boring-bit, substantially as and for the purpose set forth.

Witness my hand this 21st day of October, A. D. 1875.

GEORGE W. BADGER.

In presence of—
P. E. TESCHEMACHER,
W. J. CAMBRIDGE.