No. 752,908. PATENTED FEB. 23, 1904.

J. H. LAWLES.

BORING MACHINE.

APPLICATION FILED OCT. 29, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

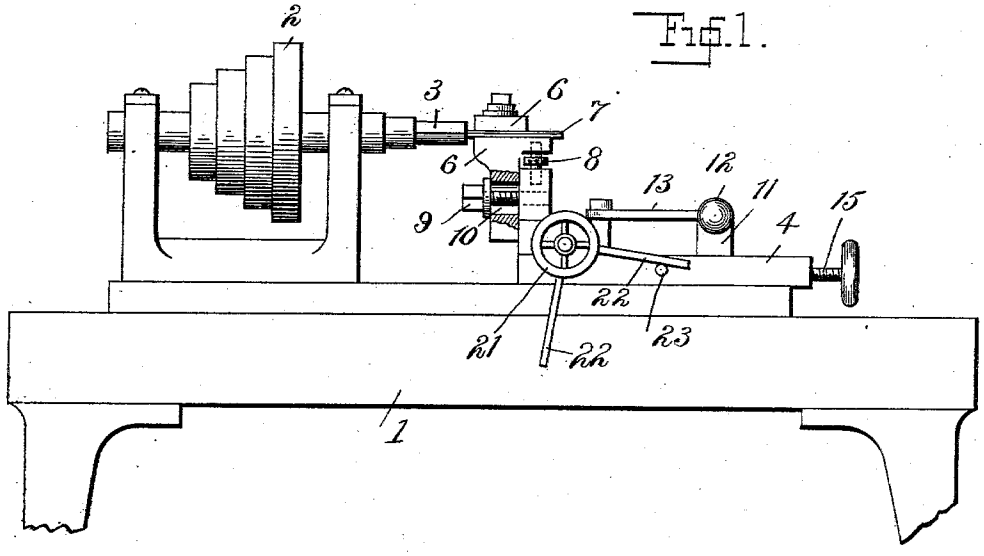
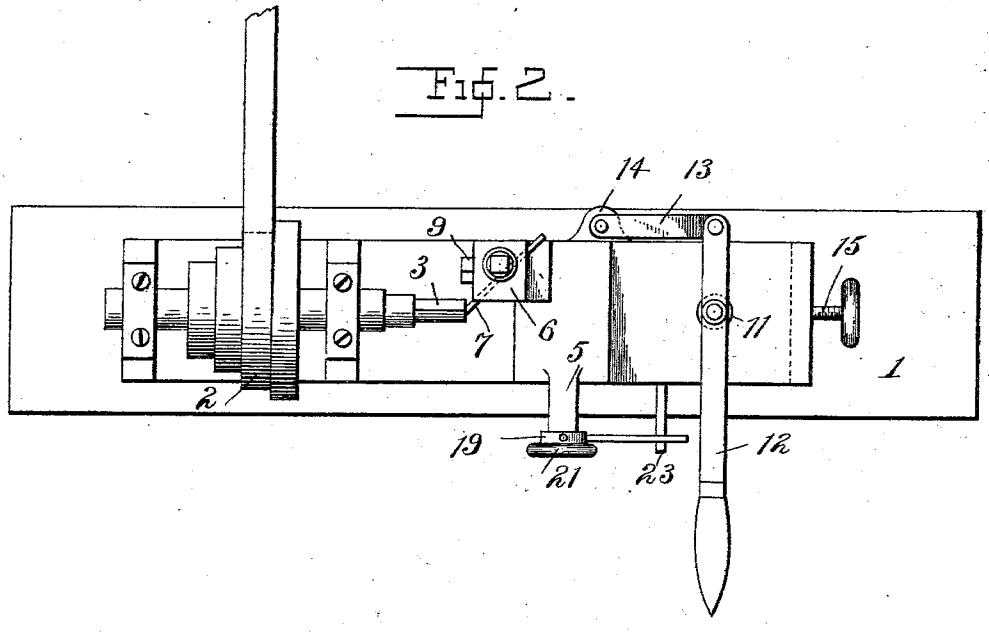


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

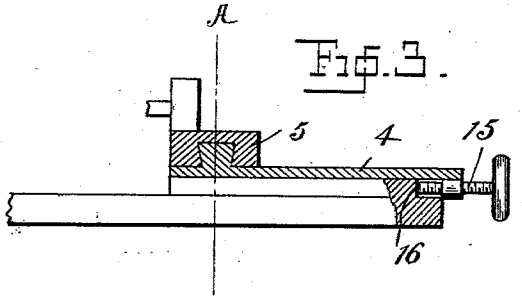


Fig. 4.

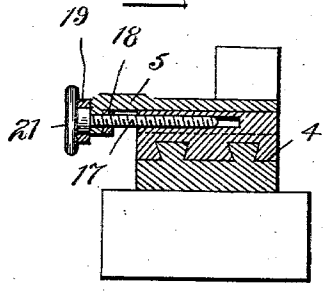


Fig. 5.

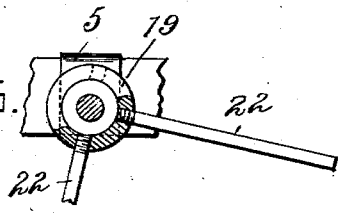


Fig. 6.

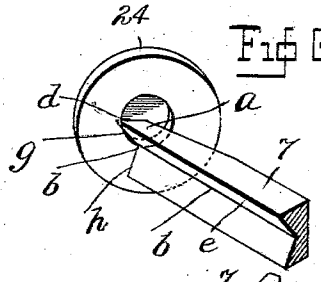


Fig. 7.

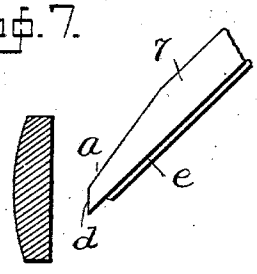
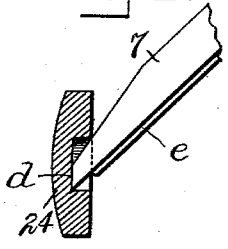


Fig. 8.



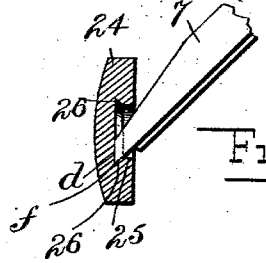


Fig. 9.

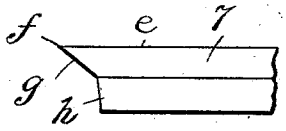
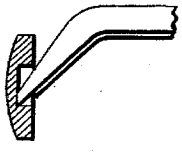


Fig. 10.



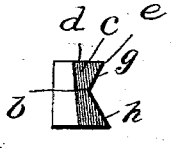


Fig. 11.

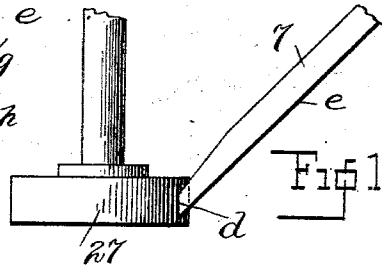


Fig. 12.

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No. 752,908. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

JOSEPH H. LAWLES, OF BROOKLYN, NEW YORK.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 752,908, dated February 23, 1904.

Application filed October 29, 1902. Serial No. 129,323. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. LAWLES, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented a new and useful Boring-Machine, of which the following is a specification.

My invention relates to boring-machines, and has for its object to bore an undercut recess or hole.

In the accompanying drawings I have illustrated the mechanism embodying my invention.

Figure 1 represents an elevation of the machine, part being shown in section. Fig. 2 is a plan view of the machine shown in Fig. 1. Fig. 3 is a detail view, partly in section, showing a portion of the sliding tool support and holder. Fig. 4 is a sectional view taken on line A A of Fig. 3. Fig. 5 is a detail showing adjusting means for the transverse slide. Fig. 6 is a view showing the tool applied to its work. Figs. 7, 8, and 9 are views showing three stages of the operation of the tool. Fig. 10 is a front elevation of the tool. Fig. 11 is an end view showing the face of the tool. Fig. 12 is a view showing the manner in which the tool is sharpened and also illustrating the form of the tool.

1 represents the bed of the machine, provided with the usual speed-changing pulleys 2 and a chuck 3 of suitable construction to hold the work.

4 indicates a sliding tool-support mounted to slide longitudinally of the bed 1 of the machine. Mounted on said slide is another slide 5, having transverse movement at right angles to the movement of slide 4. On slide 5 is the tool-holder proper consisting of suitable clamping-jaws 6, between which the tool 7 is securely held in desired position. The tool may be adjusted in height by means of adjusting-screw 8 and clamping-bolt 9, the latter passing through a slot 10 in the lower jaw 6. The longitudinal slide 4 is provided with a stud 11, on which is pivoted a lever 12. The rear of lever 12 is attached by a link 13 to an ear 14 on the bed of the machine, so that by swinging the handle of lever 12 to the right or left the slide 4 may be moved up to and withdrawn from the work held in the chuck 3. The extent of this longitudinal movement of slide 4 is adjustable and is controlled by a screw-rod 15, passing through a screw-threaded portion of the slide 4 and having its end in line with a shoulder or stop 16, as shown in Fig. 3. Slide 5 is transversely movable upon slide 4 by means of a screw-threaded rod 17, passing into a threaded portion of slide 4 and having engagement at its outer end by means of a collar 18 with slide 5, so that on turning the screw-threaded rod 17 slide 5 will be moved transversely of slide 4, carrying with it the tool 7. Means to adjust the extent of this movement are provided as follows: The depending portion of slide 5 is held in fixed engagement with screw-rod 17 by means of a collar 18 on one side thereof and the hand-wheel 21 on the other, both collar and hand-wheel being fast on the screw-rod 17. On the hub or shoulder portion of wheel 21 is a loosely-fitted ring or collar 19, having two or more radial holes therein, screw-threaded to receive screw-threaded rods 22 22, Figs. 1, 2, and 5, which pass through the ring and abut against the rod, firmly securing said collar and rods to the screw-rod 17 in any desired position. By swinging said rods in a vertical plane the screw-rod 17 is rotated and slide 5, carrying the tool, is moved in or out by an amount proportional to the angle through which the rods are swung. A stop-pin 23, Fig. 1, projects from slide 4 in the path of said rods to limit their swing, and thus limit the transverse movement of the tool-holder. By means of ring 19 and screw-rods 22 the amount of transverse movement of slide 5 may be adjusted to any desired extent, and thereby the amount of undercut. By unscrewing rods 22 22 the ring or collar 19 may be turned upon the shoulder portion of wheel 21 by reason of its loose fit thereon to bring the rods 22 22 into any desired radial position, and when adjusted in the position desired the ring or collar is secured in that position by screwing up the rods until their inner ends abut tightly against the shoulder. By having several threaded holes through ring 19 the angular divergence between the rods may be adjusted as desired, so as to obtain a greater or less throw and a correspond-

ingly greater or less transverse feed movement of the tool-holder. When the rods 22 22, ring 19, and rod 17 are properly set and adjusted to give the required amount of undercutting, the operation of the machine is exact and uniform. The stop 23 arrests the rods 22 after they have been properly adjusted, and the same amount of undercutting is made in each case without involving any skilled work.

The operation of the above-described mechanism is as follows: The work is inserted in the chuck-jaws 3, and the tool having been clamped between the jaws 6 6 and properly adjusted by the adjusting means 8 and 9 to the desired height the chuck is rotated by suitable belt connection with the power-shaft. The handle of lever 12 is then operated to bring the tool up to the work and is steadily moved in the direction of the work until the end of rod 15 engages the shoulder 16, when the desired depth of boring will have been made, whereupon the rod 22 is thrown up until the other rod 22 encounters the stop 23, thus moving the tool 7 transversely in the boring already made, thereby producing an undercut boring or recess.

While my machine is adapted for boring in any kind of material where it may be desired to produce an undercut recess, I have illustrated the same as particularly adapted to the boring of seats for shanks in the backs of buttons. In buttons having metal shanks secured thereto it is necessary to provide an undercut recess or seat for the metal shank in order that the same may be securely held therein. The making of undercut recesses prior to my invention has been exclusively by hand, the recess being first bored to the desired depth with straight or vertical walls on a lathe or boring-machine, the undercut then being required to be done by a skilled operator by hand. Even with the most skilful operator the recesses so made were not uniform, some being undercut too deeply, thereby resulting in play or looseness of fit of the shank and insecure retention of the same, so that the shank would soon fall out when in use. In other cases the recess would be insufficiently undercut, so that the base of the shank could not be properly spread into its seat, with the result that the shank could be easily pulled out of its seat or that in the act of spreading the shank the button would be split. By my invention the cutting of shank-recesses in the backs of buttons does not require the use of a skilled mechanic, but may be done by any ordinary factory operative, the work being wholly mechanical and the results obtained being in all cases uniform, so that no imperfectly set shanks result, and consequently no waste of material occurs.

In Figs. 2, 7, 8, and 9 I have illustrated the different stages of boring an undercut shank-recess in the back of a button. The button-blank is indicated by 24. Fig. 7 illustrates the button-blank ready to be operated upon by the tool 7. The tool 7 is fed toward the button-blank on a line at right angles to the face thereof by the movement of the slide 4 through the operation of lever 12. This produces in the button-blank a recess or boring of the character shown in Fig. 2, with the walls thereof parallel and vertical with respect to the rear face of the button. When the desired depth of the recess has been reached, shoulder 16 acts to arrest the forward feeding movement of the tool, whereupon slide 5 is actuated by means of rods 22 22 and the tool is fed transversely to the position shown in Fig. 9, producing an undercut recess, as clearly shown in that figure. It will be understood that the transverse movement may be adjusted to give any amount of undercutting which may be desired. Practically it is preferable to adjust said movement to give the result shown in Fig. 9, where part of the wall of the recess is vertical, as indicated at 26, this form of recess giving the desired strength of shoulder and the desired amount of undercut to retain the shank securely in place without danger of weakening the shank-retaining shoulder.

It will be understood that in order to produce the effects above described the tool must be of such a character and presented to the blank in such a way as to permit of the transverse movement necessary to make the undercut. I have illustrated in the drawings a tool of the preferred form for carrying out my invention, it being understood, however, that my invention is not restricted to the exact form of tool shown. Any tool which would admit of the movements above described may be employed. The important feature of the tool consists in its having one edge presented obliquely to the blank or obliquely to the line of the forward movement of the tool. This edge is indicated in the drawings by the letter *e*. The preferred means of accomplishing this is to employ a straight tool, as shown in the drawings, and to support the same obliquely with reference to its line of feed toward the work. This oblique mounting of the tool is clearly shown in Fig. 2 of the drawings. The same result, however, may be accomplished by employing a bent tool, the bent portion being inclined to the forward line of its movements and to the button-blank in the same way that the straight tool shown in the drawings is inclined.

It will thus be seen that I have provided a machine which will accurately and uniformly bore undercut recesses in a rapid and efficient manner and without the need of expensive skilled labor.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a machine of the character described, a tool provided with an end cutting or boring

edge and a lateral cutting edge, and mounted with said lateral edge inclined toward the forward direction of feed movement, means to feed said tool forward to the work to bore a hole of the required depth, and means to move said tool laterally while in its advanced position, to enlarge the lower portion of the hole and produce an undercut boring.

2. In a machine of the character described, a boring tool having an end cutting or boring edge and a lateral cutting edge inclined to said end cutting edge, means to secure said tool in operative position, means to feed said tool to the work in a direction inclined to its lateral cutting edge to operate its boring edge, and means to feed said tool transversely to the first-named direction of feed to operate its lateral cutting edge.

3. In a machine of the character described, a tool having an end cutting or boring edge and a lateral cutting edge and mounted to present said lateral cutting edge obliquely to the axis of the work, means to feed said tool toward the work to bore a recess of the desired depth, and means to give said tool a cutting movement transverse to said first-named direction of feed to advance said obliquely-presented lateral edge and enlarge the lower portion of the recess.

4. In a machine of the character described, a tool having an end cutting or boring edge and a lateral cutting edge and mounted to present said lateral cutting edge obliquely to the axis of the work, means to give said tool a boring feed movement toward the work, adjustable stop means to control the depth of the boring, means to give the tool a cutting movement transverse to its boring movement to enlarge the lower portion of the boring and produce an undercut recess, and adjustable stop means to control the amount of said transverse movement or undercutting.

5. In a machine of the character described, a tool having an end cutting or boring edge and mounted to present said lateral cutting edge obliquely to the axis of the work, a support for said tool mounted to slide to and from the work, a tool-holder mounted to slide upon said support in a direction transverse to the movement of said support and adjustable stops to limit said movements.

6. In a machine of the character described, a boring-tool having a lateral cutting edge and mounted to present said lateral edge thereof obliquely to the axis of the work, a support for said tool mounted to slide to and from the work, an adjustable stop device to control the extent of said sliding movement, a tool-holder mounted to slide upon said support and in a direction transverse to the movement of said support.

7. In a machine of the character described, a boring-tool having a lateral cutting edge and mounted to present said lateral edge thereof obliquely to the axis of the work, a support for said tool mounted to slide to and from the work, an adjustable stop device to control the extent of said sliding movement, a tool-holder mounted to slide upon said support and in a direction transverse to the movement of said support, a screw-rod in the support and engaged by said tool-holder whereby rotation of the screw-rod moves the tool-holder in the said transverse direction, and means to rotate said screw-rod.

8. In a machine of the character described, a boring-tool having a lateral cutting edge and mounted to present said lateral edge thereof obliqely to the axis of the work, a support for said tool mounted to slide to and from the work, an adjustable stop device to control the extent of said sliding movement, a tool-holder mounted to slide upon said support and in a direction transverse to the movement of said support, a screw-rod in the support and engaged by said tool-holder whereby rotation of the screw-rod moves the tool-holder in the said transverse direction, means to rotate said screw-rod, and adjustable stop means to limit the rotation of said screw-rod.

9. In a machine of the character described, a boring-tool having a lateral cutting edge and mounted to present said lateral edge thereof obliquely to the axis of the work, a support for said tool mounted to slide to and from the work, an adjustable stop device to control the extent of said sliding movement, a tool-holder mounted to slide upon said support and in a direction transverse to the movement of said support, a screw-rod in the support and engaged by said tool-holder whereby rotation of the screw-rod moves the tool-holder in the said transverse direction, a pair of radial arms projecting from said screw-rod, a stop projecting from the support into the path of said radial arms so as to limit the transverse movement of said tool-holder.

10. In a machine of the character described, a boring-tool having a lateral cutting edge and mounted to present said lateral edge thereof obliquely to the axis of the work, a support for said tool mounted to slide to and from the work, an adjustable stop device to control the extent of said sliding movement, a tool-holder mounted to slide upon said support and in a direction transverse to the movement of said support, a screw-rod in the support and engaged by said tool-holder whereby rotation of the screw-rod moves the tool-holder in the said transverse direction, a collar fitting loosely upon said screw-rod and provided with radial screw-threaded holes therethrough, a pair of rods having screw-threaded ends to fit the holes in said collar and secure the same upon said screw-rod in a desired position, a stop projecting from the support into the path of said rods so as to limit the transverse movement of the tool-holder.

11. In a machine of the character described, a sliding tool-support, means to slide said sup-

port comprising a hand-lever pivoted at a point between its ends upon said support, one end of said lever connected to a fixed part of the machine, an adjustable stop device to limit the movement of said support; a tool-holder mounted to slide upon said support and in a direction transverse to the movement of said support, an adjustable stop device to limit the transverse movement of said tool-holder, and a boring-tool mounted in said holder having a lateral cutting edge obliquely inclined to the direction of movement of the tool-support.

12. In a machine of the character described, a tool-holder, a feed-screw for the same, radial arms adjustably mounted on said feed-screw, means to vary the angular divergence of said arms, a stop arranged in the path of said arms to limit their movement in either direction and control the movement of said feed-screw.

13. In a machine of the character described, a tool-holder, a feed-screw for the same, radial arms mounted on said feed-screw, means to vary the radial position of said arms, and means to vary the angular divergence of said arms, a stop arranged in the path of said arms to limit their movement in either direction and control the movement of said feed-screw.

14. In a machine of the character described, a tool-holder, a feed-screw for the same, a ring loosely mounted on said feed-screw, threaded radial apertures in said ring, arms having screw-threaded ends in said ring-apertures and abutting against the feed-screw, whereby said ring and arms are securely held in any desired position, and a stop arranged in the path of said arms to limit their movement in either direction.

15. In a machine of the character described, a tool having an edge for boring a parallel-walled recess, and a lateral cutting edge inclined to said boring edge, and means to operate said edges successively in the order named, said lateral cutting edge operating to enlarge the lower portion of the recess made by the boring edge and produce an undercutting of the walls of the recess.

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