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Sheet 1-2 Sheets.

Hub Boring Mach.

No. 88,579.

Patented Apr. 6, 1869.

Fig. 1.

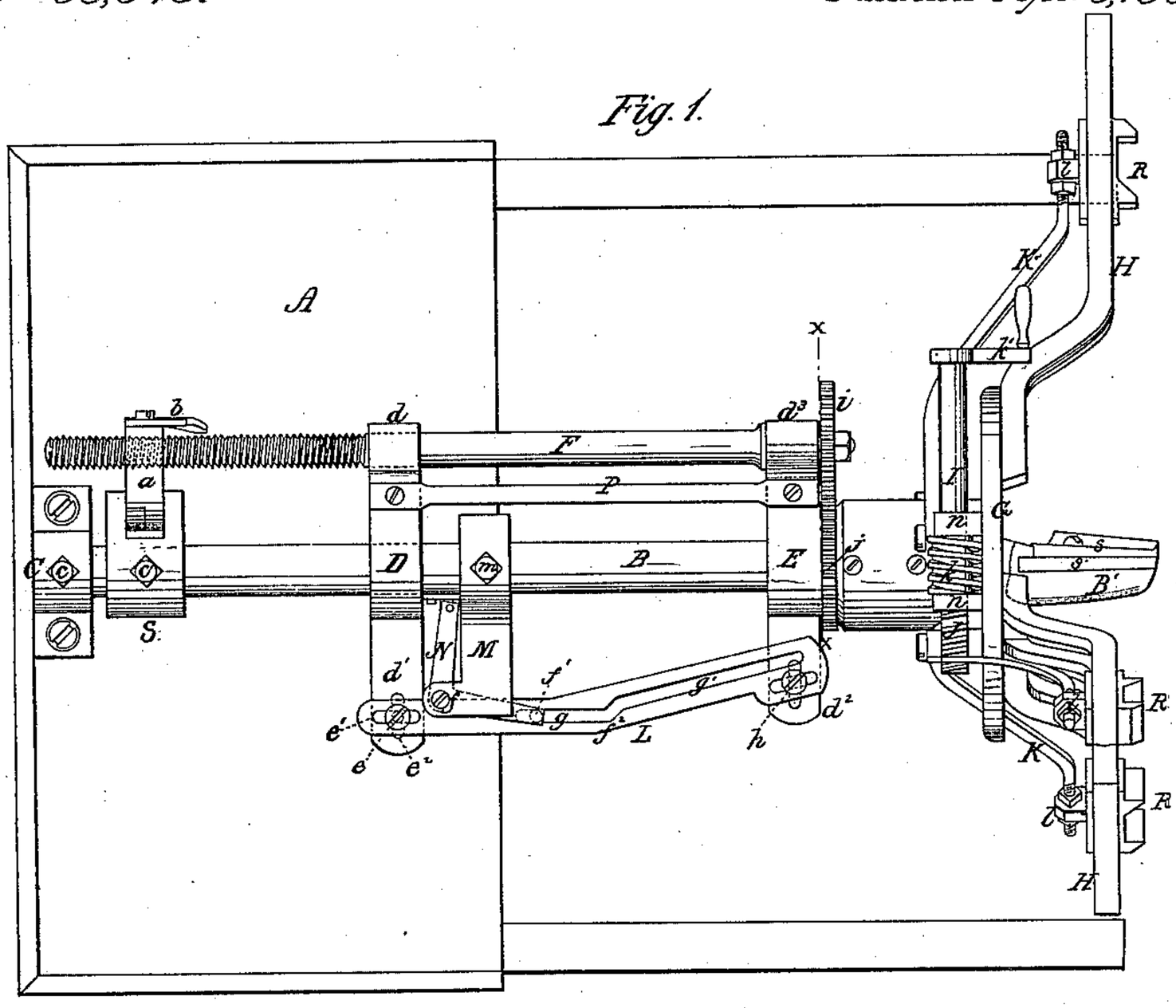
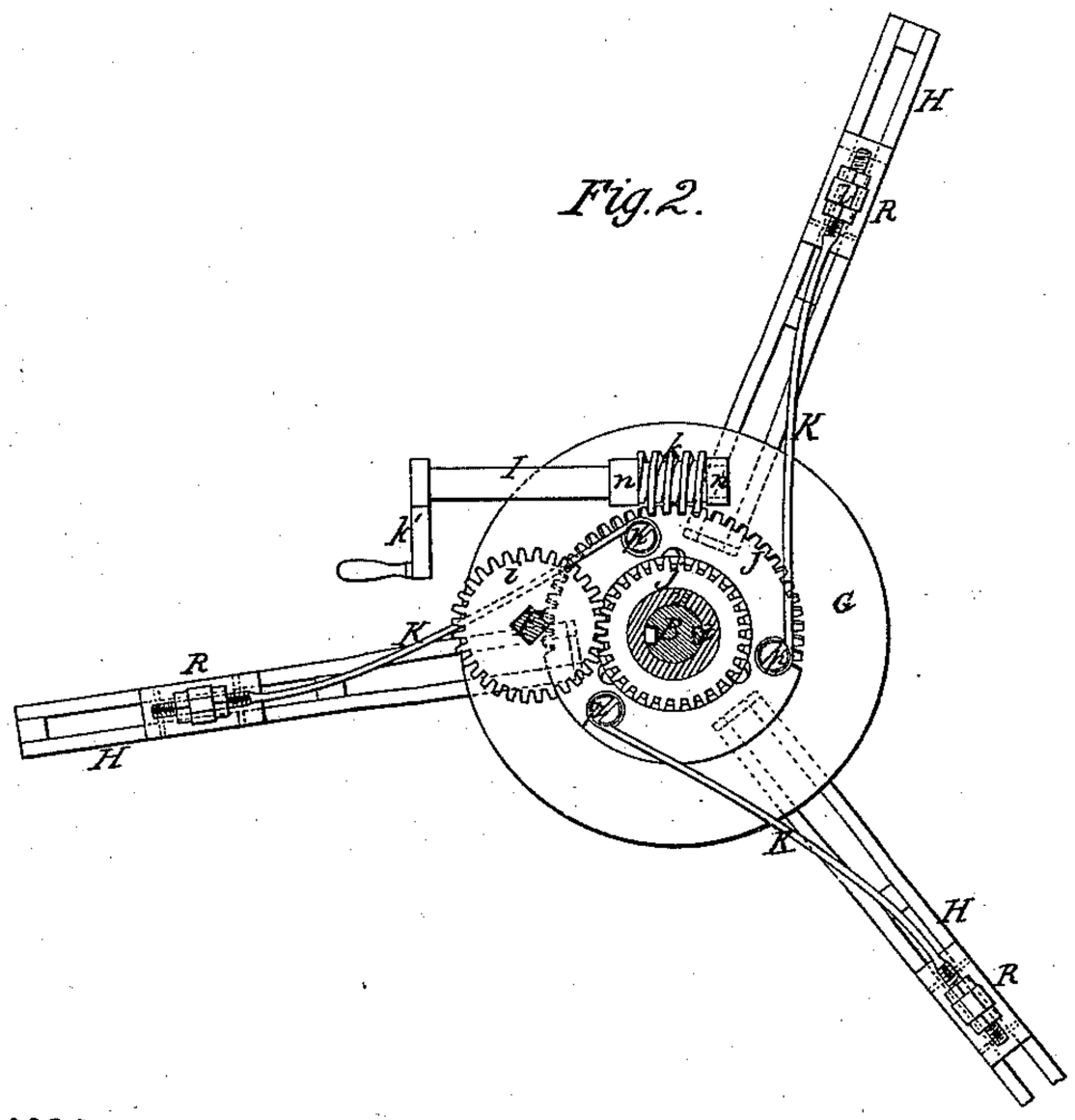


Fig. 2.



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Sheet 2-2 Sheets.

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Fig. 3.

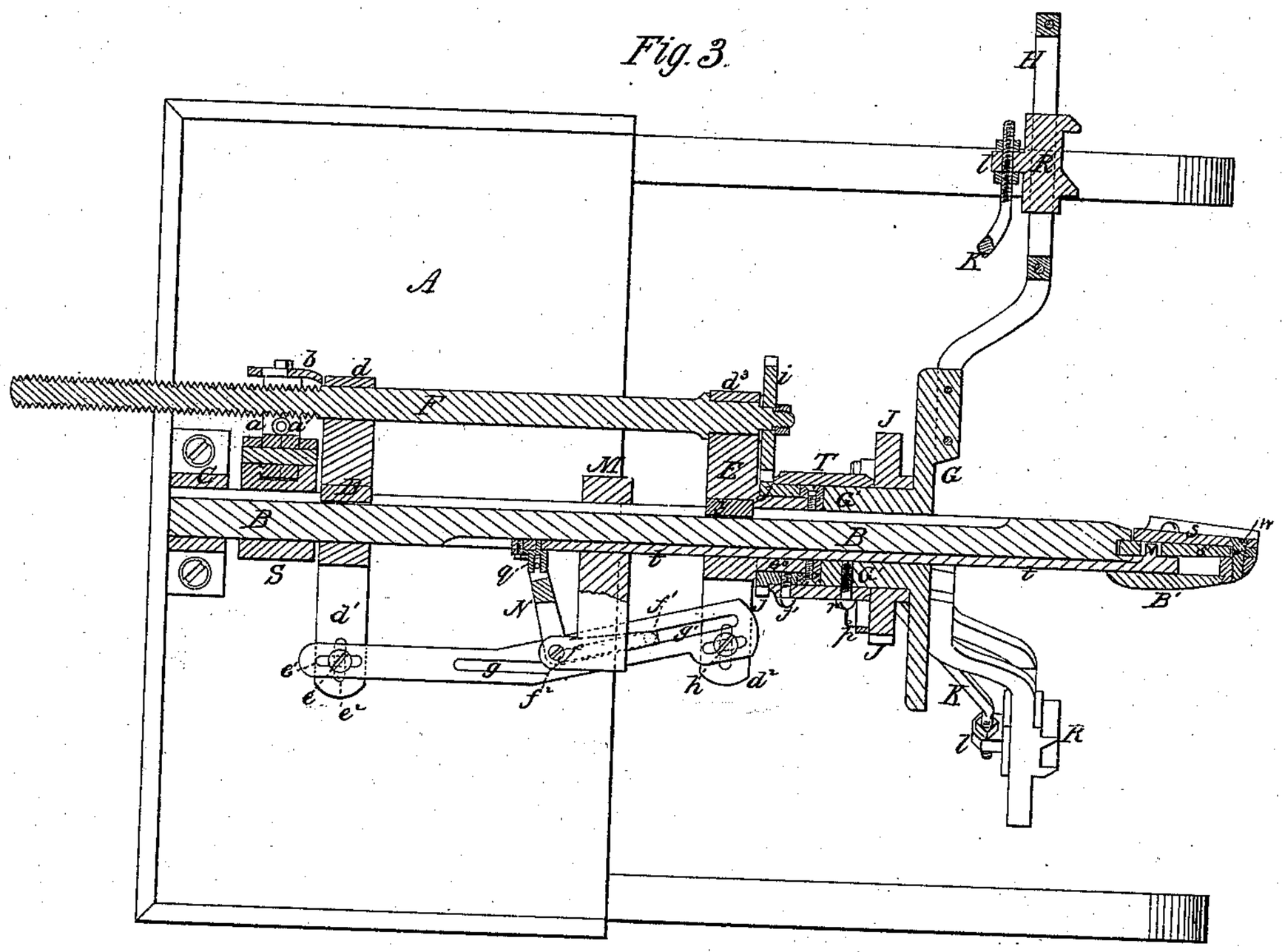


Fig. 4.

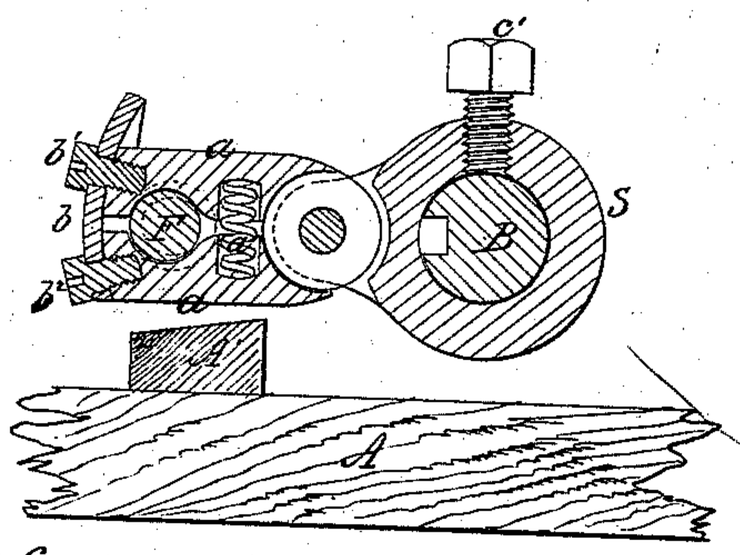


Fig. 5.

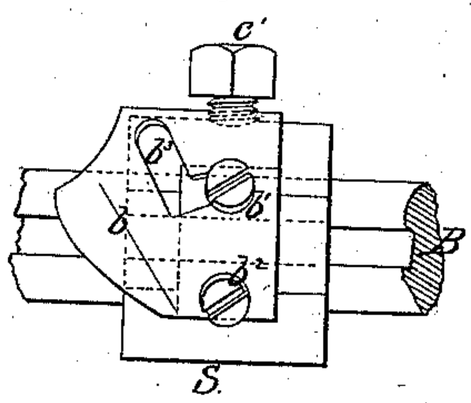


Fig. 6.

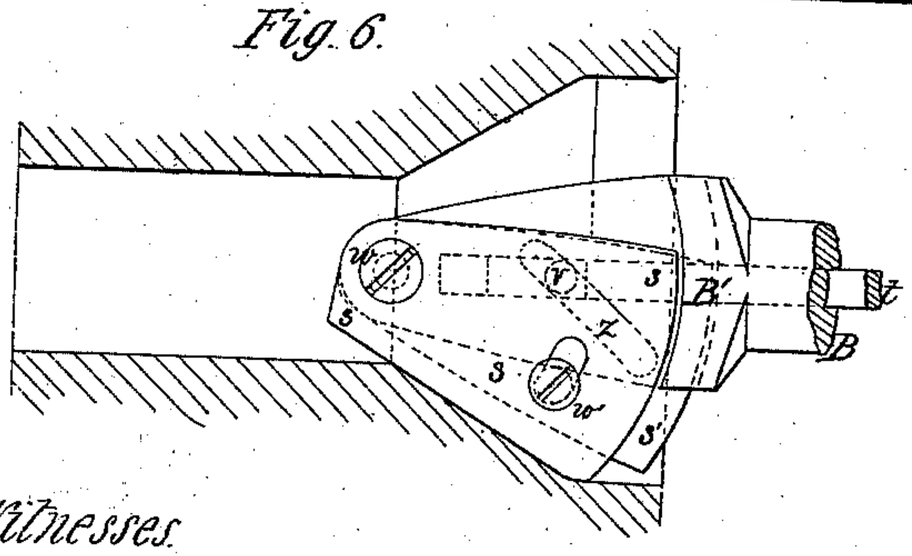
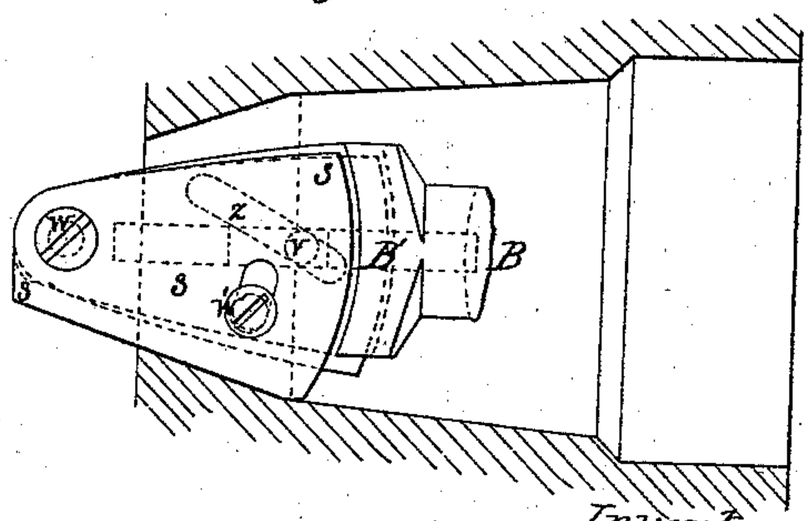


Fig. 7.



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United States Patent Office.

DANIEL MURPHY, OF DUBUQUE, IOWA.

Letters Patent No. 88,579, *dated April* 6, 1869.

IMPROVEMENT IN HUB-BORING MACHINE.

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, DANIEL MURPHY, of Dubuque, in the county of Dubuque, and State of Iowa, have invented a new and improved Hub-Boring and Shouldering Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, plate 1, is a top view of my improved machine, representing the parts adjusted for commencing the operations of shouldering and boring.

Figure 2, plate 1, is a cross-section, through the mandrel and feed-screw, taken just in rear of the feed-wheels, in the plane indicated by red line *x x* in fig. 1.

Figure 3, plate 2, is a horizontal section, taken through the principal parts of the machine, representing the several parts as they appear after each operation of boring is complete.

Figure 4, plate 2, is a vertical view, in detail, of the mandrel, and the half nuts which operate upon the feed-screw, showing these half nuts engaged with their screw.

Figure 5, plate 2, is a view of the slotted retaining and releasing-plate, which is applied to the half nuts.

Figures 6 and 7 represent the adjustable boring-lip on the mandrel, in two positions, in the act of boring through a hub.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements on machinery which is designed for boring and shouldering wheel-hubs, and adapting them for receiving axle-boxes.

My invention provides for clamping a wheel, whose hub is to be bored, to revolving arms, and centring the wheel with respect to a boring-bit which is upon a fixed mandrel, around which said arms are revolved.

The invention also provides for automatically moving a hub up to the boring-bit during the operation of boring and shouldering, and when the work of boring is complete provision is made for automatically stopping the feed-movement of the said wheel-carrying arms.

The invention also provides for automatically expanding and contracting the boring-tool in such manner that it will produce a shoulder in the hub during the operation of boring through it, all as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings—

A represents a frame, or table, which is adapted for supporting the hub-boring and shouldering devices which I am about to describe, and

C represents a tubular standard, which is secured fast on top of said table, and near one end thereof.

This standard receives through it the rear end of a horizontal mandrel, B, which is rigidly secured in place by means of a set-screw, *c*, or by any other suitable means.

This mandrel, or shaft B, is thus held in a fixed position, and in a plane parallel to the top of the table A, and on its forward enlarged end B′, a cutting or boring-bit, *s*, is applied, as will be hereinafter explained.

Upon the mandrel B, a flanged hub, G′, is applied loosely, so as to turn around the mandrel, and also to slide endwise thereon, and to the flange G of this hub, three slotted radial arms, H H H, are firmly secured, at regular distances apart, which arms are curved, as shown in figs. 1 and 3, and provided with adjustable clamping and centring-jaws R R R, which are constructed so as to receive the felloes of a wheel, and to clamp and hold the wheel to said arms centrally with respect to the axis of the mandrel B.

These clamping and centring-jaws R are arranged at equal distances from the axis of the mandrel B, and they are all connected to a toothed hub, J, by means of spring-rods K, so that by turning said hub J the jaws can be moved toward or from the axis of the mandrel.

The griping and holding-portions of the jaws R project from sliding blocks which are applied to the radial arms H, so as to work in the grooves thereof, and the thin spring-rods K are secured, at their outer ends, to lugs *l*, on said sliding blocks, and at their inner ends these rods are pivoted, at *p p p*, to the back face of the hub J, as clearly shown in fig. 2.

The hub J is applied upon the hub G′, between its flange G and the front end of collar T, so as to turn freely, and engaging with the teeth of this hub, is a worm-screw, *k*, which is keyed to or formed on a tangent shaft, I, that has its bearings in lugs *n n*, formed on the back of flange G, and that has a crank-handle, *k′*, applied on one end, as shown in figs. 1 and 2.

It will be seen that by turning the shaft I, the three clamping-jaws R will all be moved equal distances toward or from the axis of the mandrel, and that by means of this adjustment a wheel can be centred and confined rigidly in place to the front sides of the radial arms H, in proper position for boring its hub, and when the boring is complete such wheel can be readily removed from said arms.

The cylindrical collar T extends back to a spur-wheel, *j*, and is secured by a screw, *r*, to the hub G, as shown in fig. 3.

The toothed wheel *j* is formed on a collar, which is also secured to the collar T, by a screw, *j′*, and which is applied, upon a hub, e^3, of a yoke, E, upon mandrel B, shown in fig. 3.

The collar of wheel *j* encircles an annular groove made in the hub of yoke E, so that this yoke will receive endwise movements on the mandrel B, with the flanged hub G and its arms.

The yoke E, above referred to, is constructed with arms d^2 d^3 extending from opposite sides of it, and also with a key-tenon, *y*, which latter enters a groove made longitudinally in the mandrel B, and prevents the yoke from turning around this mandrel.

Through an eye which is formed on the arm d^3 of yoke E, a screw-rod, F, passes, which rod carries, on its front end, a spur-wheel, *i*, that engages with the teeth of spur-wheel *j*, and is turned by this latter spur-wheel.

The screw-rod, or feed-screw F, extends back in a line parallel to the mandrel B, and passes loosely through an eye which is made through an arm, *d*, of a yoke, D, and during the operation of boring this feed-screw engages with two half nuts, *a a*, on a collar, S, which is secured fast to the mandrel by a set-screw, C′, as shown in fig. 1.

The yoke D is applied to the mandrel B by means of a key-tenon, working in the groove in this mandrel, and it is constructed like the yoke E, with two arms, *d* d^1, and connected fast to the yoke E, by means of rods P and L, so that both yokes will move with the hub G and its wheel-carrying arms, forward and backward upon the fixed mandrel B.

The half nuts consist of two screw-tapped portions, *a a*, which are pivoted to the fixed collar S, and provided with an expanding-screw, *a′*, and a slotted holding and releasing-plate, *b*.

The plate *b* is constructed with an L-shaped slot through it, which receives a pin, b^1, that projects from the end of the top half nut *a* to the end of the bottom half *a* of the nut.

When the plate *b* is moved back by the arm *d* of yoke D pressing against it, the spring *a′* will separate the two half nuts, and disengage them both from the feed-screw F, and when these nuts are pressed together, and plate *b* forced forward by the hands, the pin b^1 and its L-shaped slot b^3 will hold the half nuts as set until plate *b* is again pressed back by the yoke D in its backward stroke.

The boring-tool consists of a segmental plate, or bit *s*, having a cutting-lip formed on one edge, as shown in figs. 1, 3, 6, and 7.

This plate is pivoted to the flattened side, and near the tapering end of the enlargement B′ of the mandrel B, by a screw-pivot *w*, which also passes through and serves as a pivot for a segment-plate, *s′*, between the bit *s* and flat side of the mandrel-enlargement.

The bit-plate *s* is again attached to the intermediate segment-plate, by a set-screw, *w′*, which passes through a slot made through the bit-plate, and allows this plate to be adjusted and set for boring a larger or smaller hole, as may be required, and also for compensating for the wearing away by sharpening of the bit.

The rear end of the segment *s′* is guided in a groove made in the enlargement B′, and in this segment a curved slot, Z, is formed, in which works a stud, V, which is formed on the front end of an endwise-movable rod, *t*. The slot Z is made so that by moving rod *t* in a direction with its length the cutter-bit can be moved laterally.

This rod *t* lies in a groove made in the mandrel B, and extends back in this groove through a fixed hub, M, and is attached by a loose pivot-connection, *q*, to one arm of a right-angular lever N, as shown in fig. 3.

The lever N is pivoted, at *f*, to an arm of hub M, and its outer end has a stud, f^1, upon it, which enters a slot which is made in a bar, L.

This bar L is secured to the arms d^1 d^2 of yokes D E, by means of set-screws *e h*, which pass through slots made through the bar L and arms d^1 d^2. This attachment of bar L admits of its being adjusted endwise, and also set further from or nearer to the mandrel B, as may be required.

The groove which is made in the bar L is designed to act upon lever N, rod *t*, and bit *s*, so as to produce a cylindrical hole for a short distance in the hub, then to form a shoulder, and to finish with a tapering hole.

The stud f^1 runs in the straight portion *g* of said slot, which is parallel to the axis of mandrel B while the cutter *s* is producing the cylindric hole in the hub. The stud f^1 is then acted upon by the short oblique portion f^2 of the slot while the cutter is producing the shoulder in the hub, after which the stud f^1 passes into the oblique portion *g′* of said slot, and produces the tapering bore through the hub.

It will thus be seen that during the operation of boring a hub, the slotted bar L serves as a pattern for giving such lateral movements to the bit-plate *s* as will produce a shouldered bore through a hub.

Having particularly described the several parts of my improved machine, I will now briefly describe the operation of said parts during the act of boring and shouldering a hub.

A wheel whose hub is to be bored is confined rigidly in place to the radial arms H H H, by means of the clamping-jaws R, so that the axis of the hub coincides with the axis of the mandrel B. The half nuts *a a* are then brought together and held by the plate *b*, so as to engage with feed-screw F. When this is done, the parts should occupy the relative positions shown in fig. 1.

When the wheel, with the arms H and the hub G, are now turned by hand, or otherwise, the spur-wheel *j* will cause the feed-screw to turn and move the hub backward with a proper relative speed to the cutting-action of the bit *s*.

While the stud f^1, on lever N, lies in the parallel portion *g* of the slot which is through the bar L, the cutting-tool, or bit *s*, will produce a cylindrical hole in the hub, but as the bar L moves back the short oblique slot f^2 will be caused to act upon stud f^1, and retract the bit *s* abruptly, so as to produce a shoulder in the hub, as shown in red lines, fig. 7. The oblique slot *g′* then continues to gradually retract the bit *s*, so as to produce a tapering hole from said shoulder to the end of the hub.

When the boring-bit is through the hub, the arm *d* of yoke D will press against the plate *b*, and by moving it backward allow spring *a′* to separate the half nuts *a a*, and thus disengage screw F from them, and stop the further backward movement of the parts.

The operator now draws the wheel with the parts to which it is attached, to the position shown in fig. 1, and detaches the wheel from its arms, leaving the parts in position to receive another wheel, whose hub is to be similarly bored and shouldered.

The use of half nuts *a a* facilitates the forward movements of the wheel-carrying devices after the completion of boring and shouldering each hub.

Having described my invention,

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

1. The combination of the stationary shaft, or mandrel B, with the pivoted expansible tool *s* upon one end, and sliding rod *t* arranged upon its side, substantially as and for the purpose described.

2. The stationary shaft, or mandrel B, expansible cutting-tool *s*, rod *t*, pattern-bar L, guide N, and rotary wheel-holding device, combined substantially as shown and described.

3. The slotted pattern-bar L, lever N, slide-rod *t*, pivoted cutting-tool *s*, mandrel B′, rotary wheel-holder G H R, or its equivalent, and feeding-device F and *a a*, combined substantially as described.

4. The combination of toothed hub J and worm-screw *k*, radially-sliding clamping-blocks R, applied to arms H, and rods K, all arranged substantially as and for the purpose described.

5. The arrangement of the sliding yokes E D, fixed mandrel, or cutter-carrying shaft B, yoking pattern-bar L, cutter *s*, rod *t*, feed-screw F, and adjustal

vices R, for boring, centring, and holding wheels of different sizes, substantially as described.

6. The slotted pivoted plate b b^3, arranged with the half nuts a a and spring a', substantially in the manner described.

7. The spur-wheel j, applied around the fixed cutter-carrying mandrel B, and connected to the hub of the wheel-holder, in combination with the spur-wheel i, upon the feed-screw F, sliding yokes D E, pattern-bar L, rod t, and expansible cutter s, all substantially as and for the purposes described.

8. The pivoted segmental cutter s, applied to a plate, B′, of the mandrel B, as described, and so that it may be adjusted and set for boring holes of different diameters, and also expanded and contracted, or *vice versa*, after being thus set, all substantially as described.

9. The construction and arrangement of mechanism as herein described, for the purpose of boring a hub.

DANIEL MURPHY.

Witnesses:

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