

BENJAMIN LAWRENCE.
No. 121,878.

3 Sheets--Sheet 1.
Improvement in Lathes.
Patented Dec. 12, 1871.

Fig. 1.

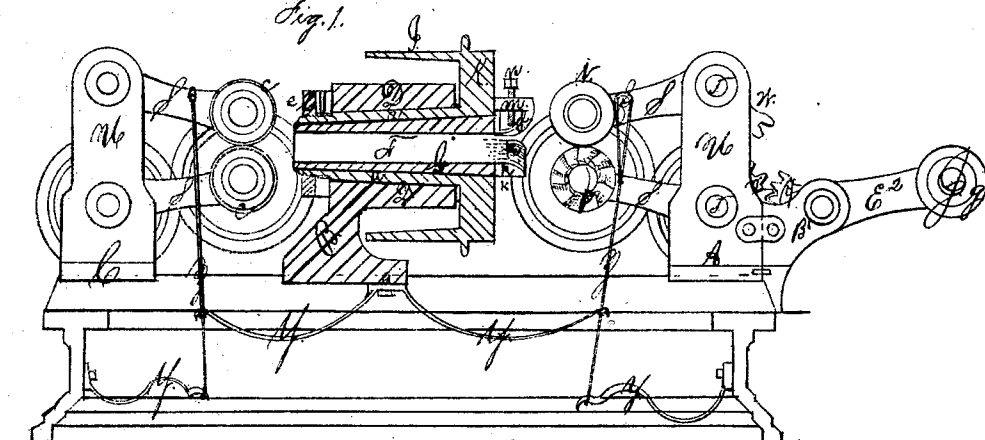


Fig. 2.

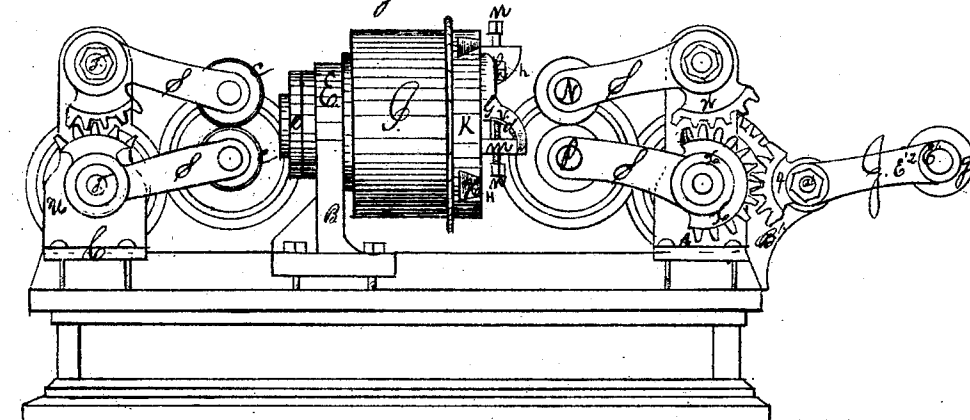
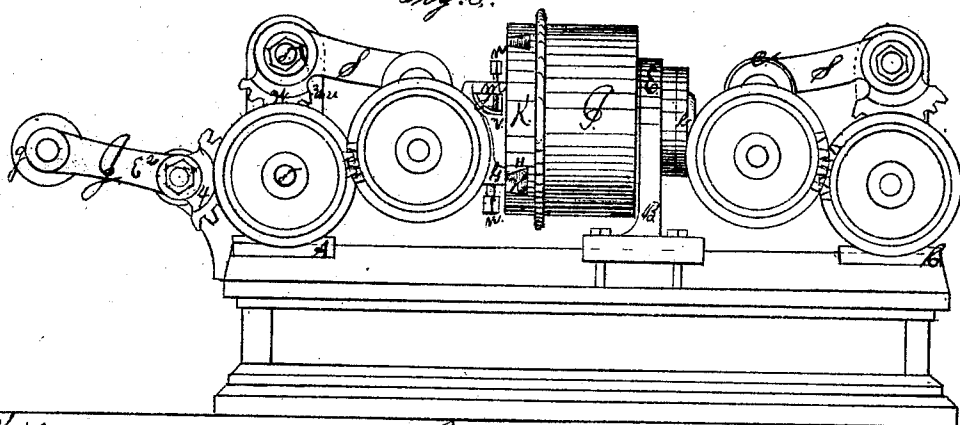


Fig. 3.



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Fig. 5.

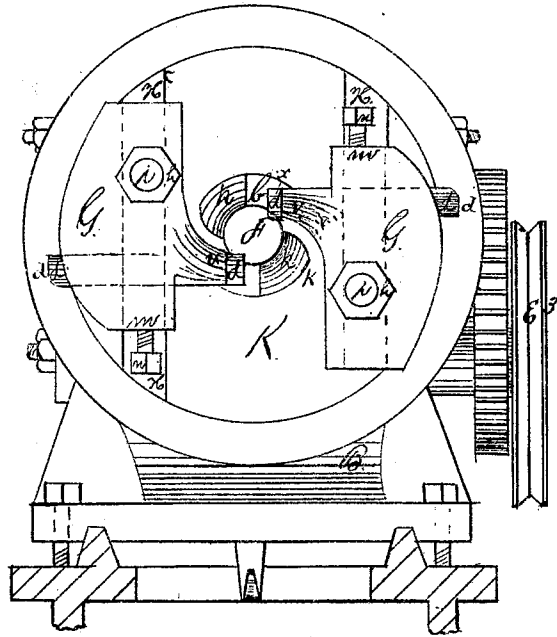
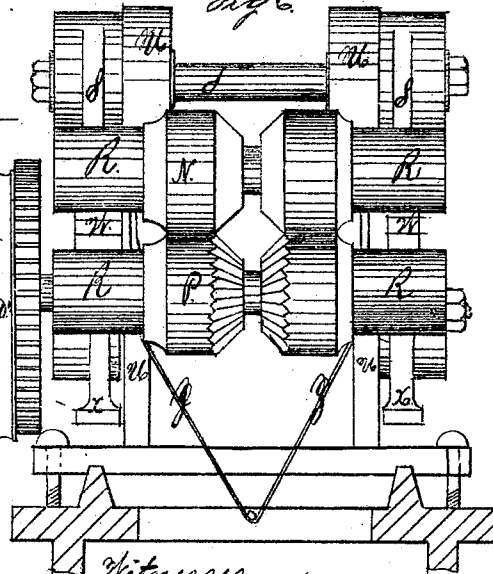
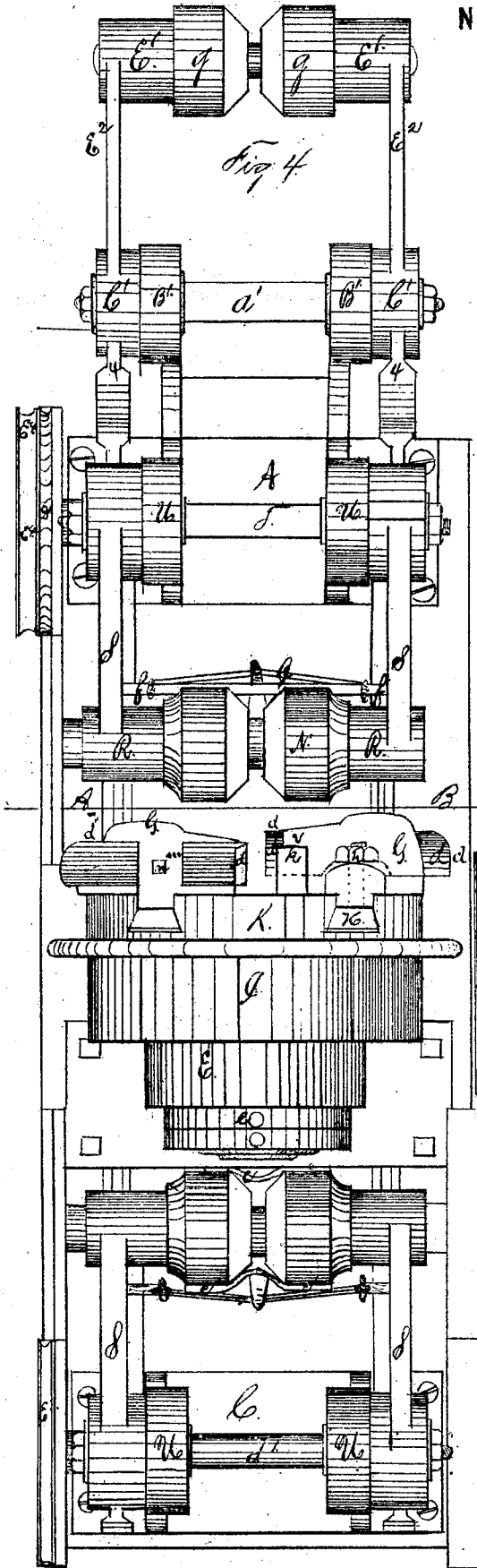


Fig. 6.



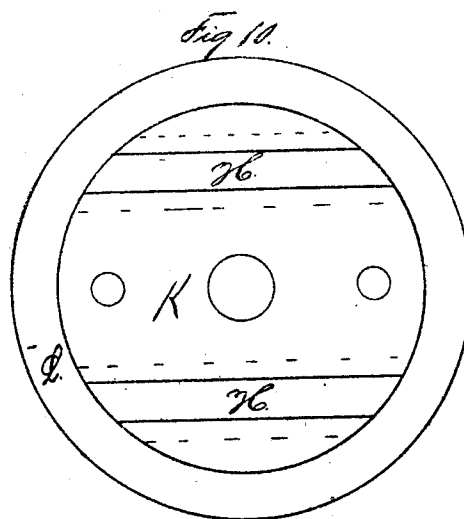
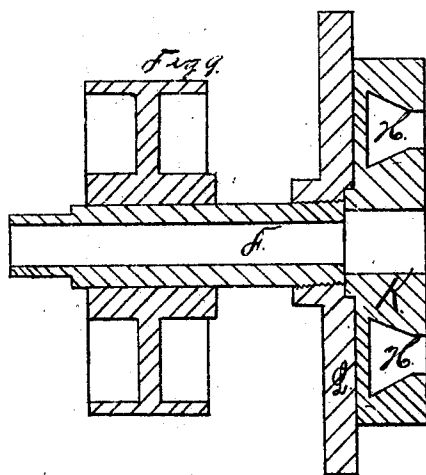
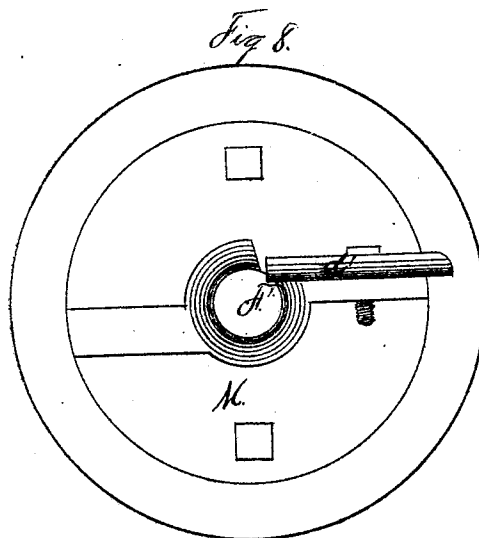
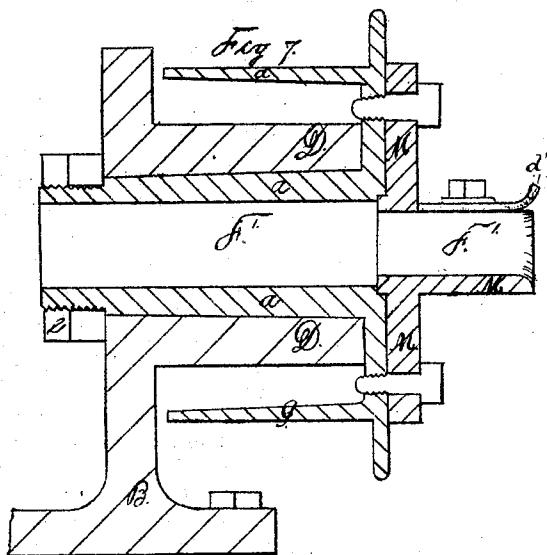
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BENJAMIN LAWRENCE.
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Improvement in Lathes.
Patented Dec. 12, 1871.



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UNITED STATES PATENT OFFICE.

BENJAMIN LAWRENCE, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN LATHES.

Specification forming part of Letters Patent No. 121,878, dated December 12, 1871.

To all whom it may concern:

Be it known that I, BENJAMIN LAWRENCE, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Baluster-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1, Sheet 1, represents a central vertical longitudinal section. Figs. 2 and 3 are opposite side elevations. On Sheet 2, Fig. 4 represents a plan or top view. Figs. 5 and 6 are opposite transverse sectional elevations on the line A B of Fig. 2. On Sheet 3, Fig. 7 represents a sectional elevation of the cutter-head pulley with the ordinary baluster-turning device applied to the face thereof. Fig. 8 is a face view of Fig. 7. Fig. 9 is a sectional elevation of an ordinary shaft and pulley, with the slotted tool-holder plate applied to the face of a common face-plate. Fig. 10 is an end or face view of Fig. 9.

This invention consists—First, of a cutter-head composed of a pulley, a slotted plate, K, tool-holders G and cutters, and a removable bushing, *b*, all the parts being constructed, arranged, and co-operating together for the production of the desired result, viz., of turning balusters straight and of uniform size. Second, my invention consists of a rest or guide, J, being composed of a roll, *g*, arranged upon pivoted arms, and provided with segmentary gears arranged and operating in connection with the feed-rolls N and P, substantially as shown in the drawing.

In constructing my improved baluster-machine and in operating the same I first provide a suitable bed or base similar to a common lathe-bed or that of a common horizontal steam-engine, and upon the top of this I arrange and permanently secure the stands A, B, and C, which support the working parts of the machine. The central stand B, which forms the bearing and support for the cutter-head pulley I and its connections, is formed, as clearly shown in the drawing, with a projecting hub, D, which, with the central ear E, gives sufficient length of bearing for the pulley-bush or hub *a*, so that only one support is required; and by extending the hub D so far into the pulley the stand, pulley, slotted cutter-head plate, and tool-holders are made very compact in their construction, combination, and arrangement, besides being permanent and dura-

ble, and not likely to get out of order or to remain loose. If worn on either part the pulley is only to be drawn endwise by turning a nut, *e*, on the end of the bush, when it will fit and fill as before. (See Fig. 1.) Within the pulley-bush or hollow arbor I insert a metal bushing, *b*, which is tapering on its outer surface, and fits and fills the tapering hole in the arbor which surrounds it. This inner bushing is easily removable to substitute another, which has a larger or a smaller central passage, F, the diameter of which should be precisely the diameter of the finished rod or roll which has passed the cutters, which are adjustable in two ways: in one way by moving the tool-holders G and the cutters *d* from or toward the center, or inward or outward in the dovetail slots H, first slackening or turning back the nuts *h* on the outer ends of the bolts *i*. The heads of these bolts are fitted in the dovetail slots, and when screwed up or tightened they draw the tool-holders firm against the face of the slotted plate K. The other adjustment of the cutters is by set-screws *n*, which screw through each tool-holder cap *m* and bind the cutter firmly against the curved side *v* of the passage made in each tool-holder for the reception of a cutter, which is moved inward or outward by its own adjustment, or in either opposite direction by moving the tool-holder; and thus the cutters are set or adjusted to form rolls of any diameter within the capacity of the machine, or which fill the passage in any suitable bushing which guides the finished roll from the cutters, and thus insures its perfection. The usual concave or curved lips *k* project from the end of the bushing *b* to hold the rough material up to the cutters. The slotted plate K, with the tool-holders and cutters, made adjustable as described, may be used on a common face-plate, L, and with a hollow spindle of an ordinary turning-lathe, (see Figs. 9 and 10,) and the stuff fed by hand. In this way rods or rolls of different sizes may be formed by changing the bushing *b* and by adjusting the cutters, as before described; but in this case the bushing should be shortened or the passage F through the hollow spindle enlarged so as to receive bushings of different sizes. The cutter-head pulley, constructed as described, with a hollow arbor or bush, *a*, and the supporting-stand B, with a sleeve-hub, D, may be used to support and carry the common baluster-forming device M, as shown in Figs. 7 and 8; or this may be removed and the

slotted plate, tool-holders, and cutters substituted. The common baluster-forming device is capable of forming but one size of roll or rod, since the diameter of the finished roll must correspond with the diameter of the central passage E' which guides it, and the cutters d'' can be set to form only one size of roll; otherwise there would be no guide for the finished roll after passing the cutter. The removable bushing and the adjustable cutters provide for forming rolls of various sizes, as before described. Directly in front of the cutter-head I provide certain feed-rolls N and P , the lower one fluted or roughened and the upper one either roughened or plain, and these are arranged in bearings R , at or near the extremities of arms S S , secured to the ends of fulcrum-rods T which pass through ears or flanges U rising from and forming part of the stand A . Segmentary gears W and X connect the fulcrum or pivoted ends of the arms together, and when the rough material passes between the feed-rolls the gears cause them to rise and fall equal distances—that is, if the lower roll is depressed the gears cause the upper one to rise—and this equal separation of the feed-rolls insures the guiding of the rough material directly to the center of the cutter-head, and between the cutters, which rotate rapidly around the stuff fed endwise and remove the surplus wood and form the rod or roll. One cutter projects beyond and is set back of the circular line of the other as a roughing-cutter, while the finishing-cutter is set to the circle of the inner passage through the bushing b , and will finish the forming-roll of that diameter. Pressure is applied to the feed-rolls to cause them to feed the rough material to the cutters by a spring, Y , (or a weight) and by a chain or a cord, Z , caught under the hook end of the spring and passed upward and over a cross-rod, L , in the upper arms thence downward, and its ends secured by hooks or otherwise to the lower arms, thus drawing the free ends of the arms and the feed-rolls together, all as clearly shown in Fig. 1. At the rear end of the cutter-head pulley, and on the top of the bed-piece, I secure another stand, C , having ears or flanges U and segmentary-gear arms and feed or draft-rolls, arranged substantially like those previously described, except that the draft-rolls are covered with rubber or other soft substance c , seen in section in Figs. 1 and 4 and in end elevation in Figs. 2 and 3. This softer covering of the draft-rolls prevents the finished roll or rod being injured when drawn forward after leaving the cutters. These draft-rolls have a spring (or a weight) and a chain or cord for pressing them together, as do the feed-rolls, except that the chain or cord, after its hook, is

hooked under the end of the spring, the ends are carried upward and secured to the upper arms by hooks, and the pressure of these rolls is produced by the action of the segmentary gears and by the spring and chain operating together. The spring furnishes the operating power, and the gears connect the two together; and when the upper roll is raised the lower one must be depressed the same distance. Back of the feed-rolls I apply a rest or guide, J , consisting of a grooved roll, g , supported in bearings E^1 at the free ends of arms E^2 , having segmentary gears 4, similar to those first described, and arranged on a fulcrum-rod a' passing through stands B' and through the hubs C' of the arms of the rest. This rest is set at the same height of the feed-rolls, and when the stuff enters between them the rest falls the same distance that the lower feed-roll is depressed, and this keeps the rough material in line with the center of cutter-head and guides it direct to the rotating-cutters. While the feed-rolls carry it forward the cutters form the rod or roll, and the draft-rolls remove it in a superior finished condition. The lower feed-roll is geared to the fulcrum-rod F , on the end of which is a pulley, D' , and this pulley and these gears impart rotary motion to the feed-roll. A similar gear is secured to one end of the lower draft-roll and another on the fulcrum-rod or shaft F' , and also a pulley, E^3 , like or similar to the pulley D' ; and a belt or band may pass round both of these pulleys, and one part or series of rolls be driven from the other. An outer pulley, E^4 , beyond the pulley D' on the shaft F' , is for the application of a belt to drive the machine.

It will be obvious that the cutter-head and the adjustable cutters may be used with or without the feed-rolls or the draft-rolls or the rest; but for most kinds of work I prefer using all or nearly all the parts together.

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

1. The combination of the cutter-head or its operative parts, consisting of a pulley, a , slotted plate K , tool-holders G and cutters, and a removable bushing, b , all constructed, arranged, and operating substantially as and for the purpose specified.

2. The rest or guide J , consisting of a roll, g , and arms and segmentary gears, arranged and operating in connection with the feed-rolls N and P , in the manner and for the purpose specified.

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(172)