P. M. HAAS. 2 Sheets—Sheet 1.

Machine for Turning Balusters.

No. 226,912. **Patented April 27, 1880.**

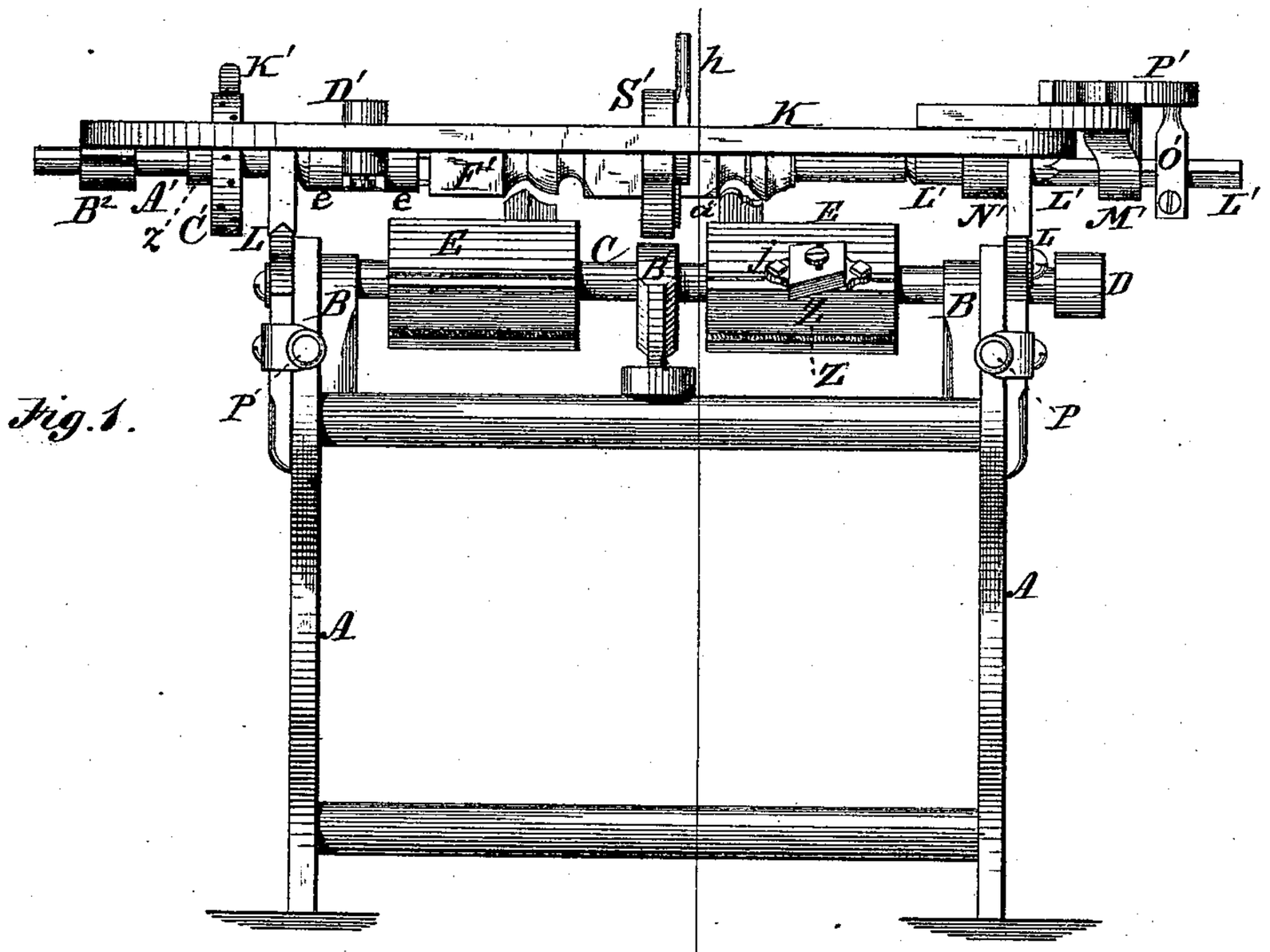
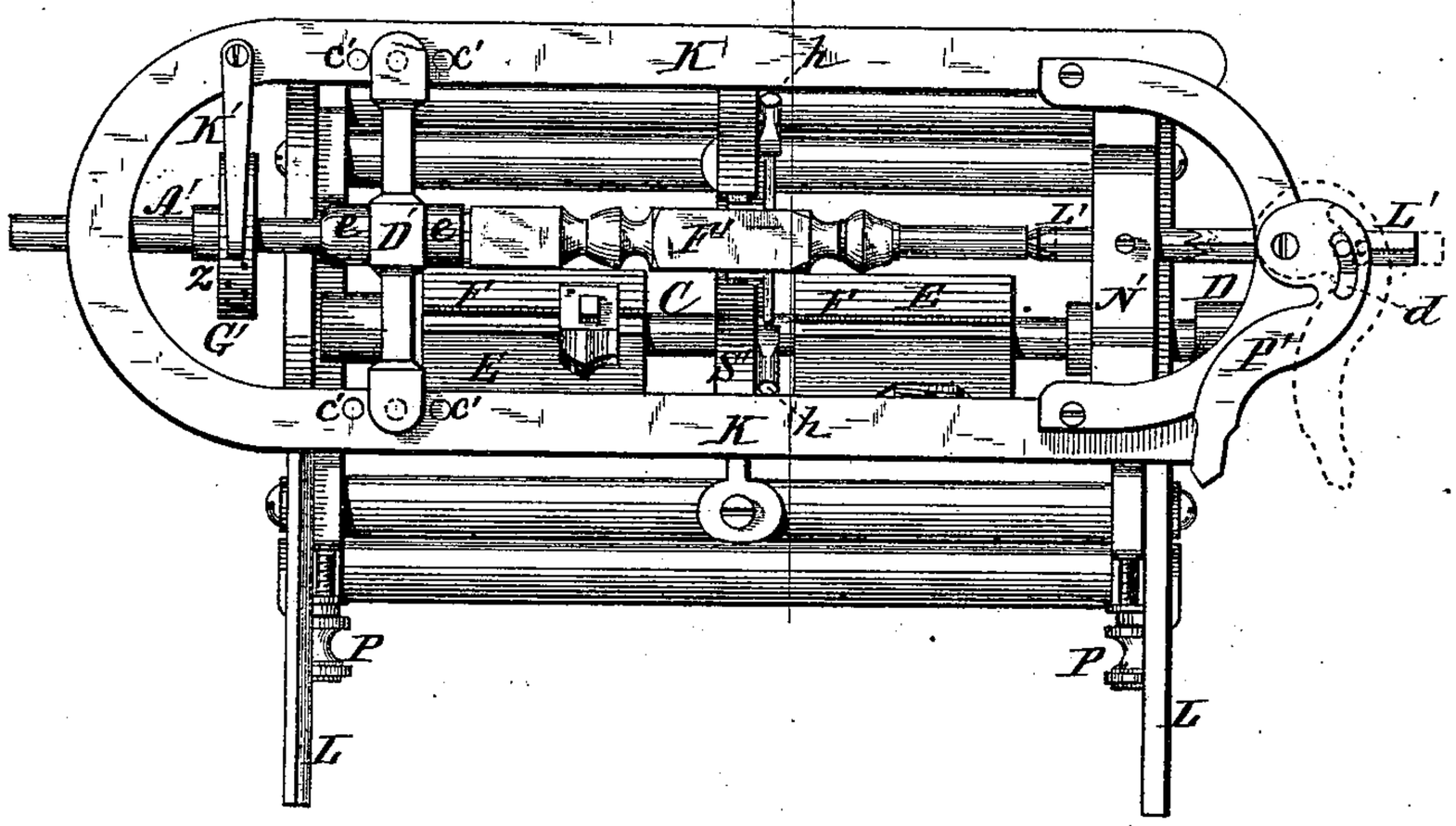


Fig. 1.

Fig. 2.



Attest
W. H. H. Knight
Floyd Harris.

Inventor;
Philip M. Haas
by Johnson & Johnson
Attys.

2 Sheets—Sheet 2.

P. M. HAAS.

Machine for Turning Balusters.

No. 226,912. **Patented April 27, 1880.**

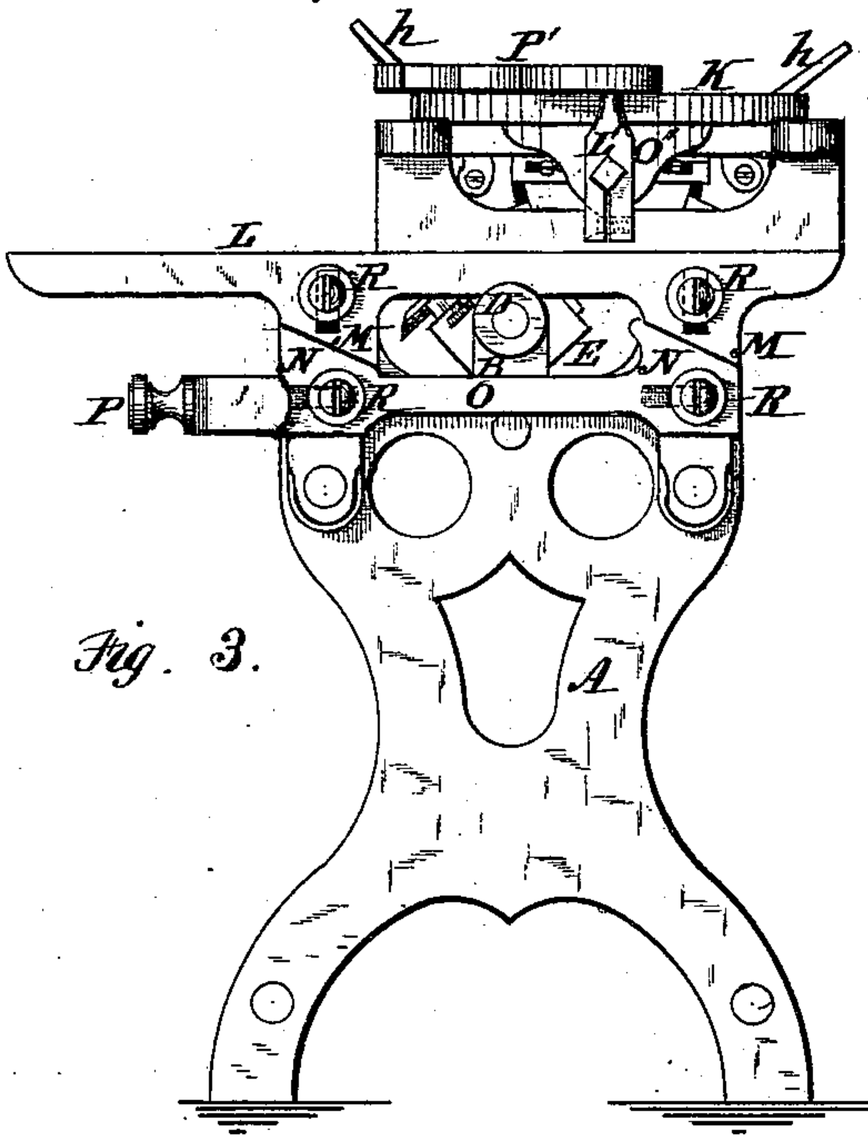


Fig. 3.

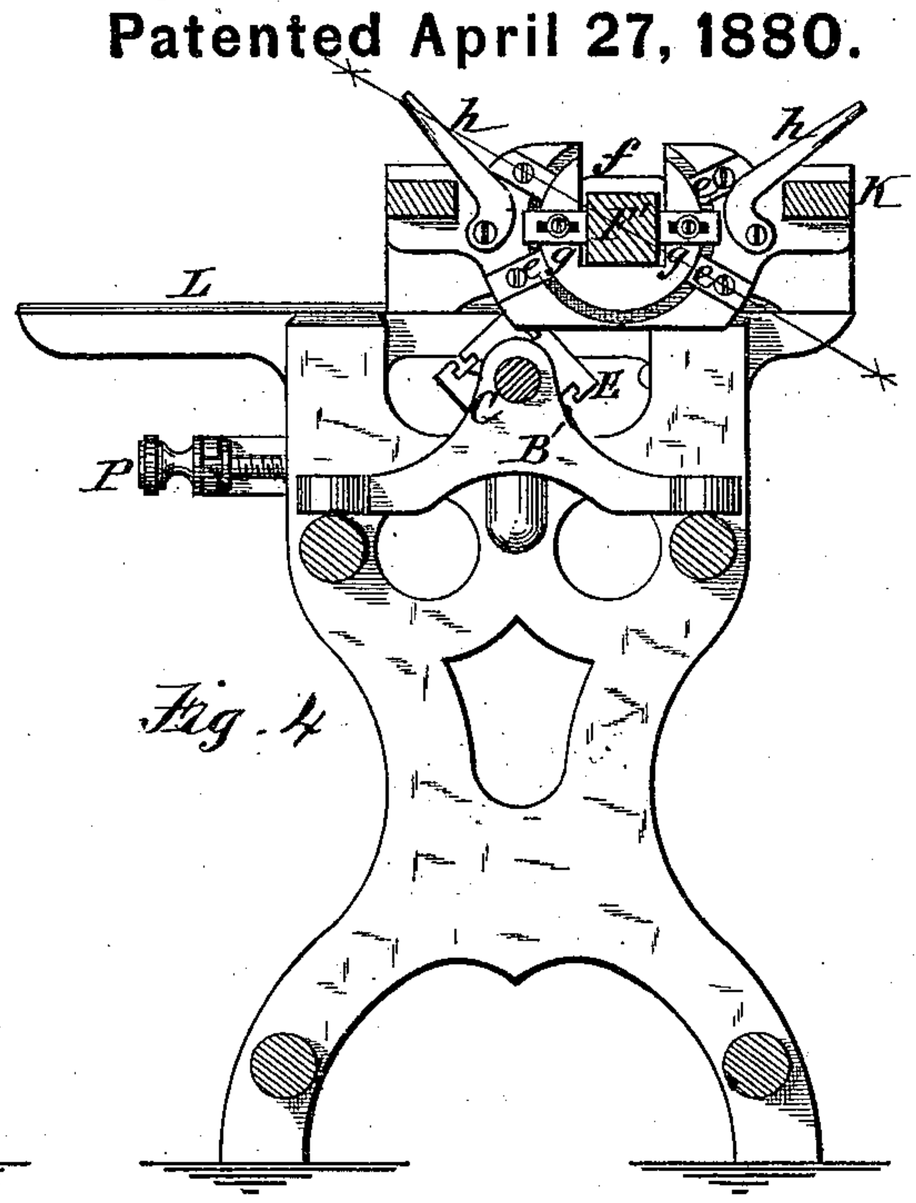


Fig. 4.

Fig. 5.

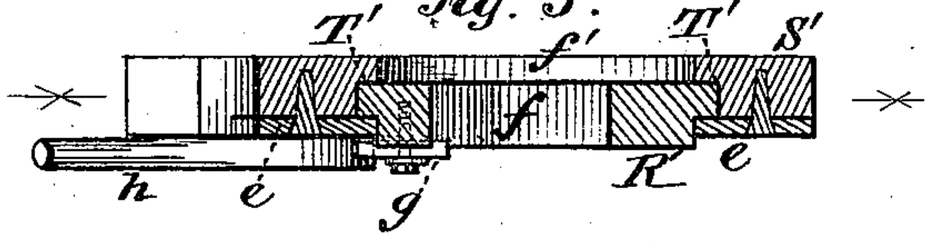


Fig. 7.

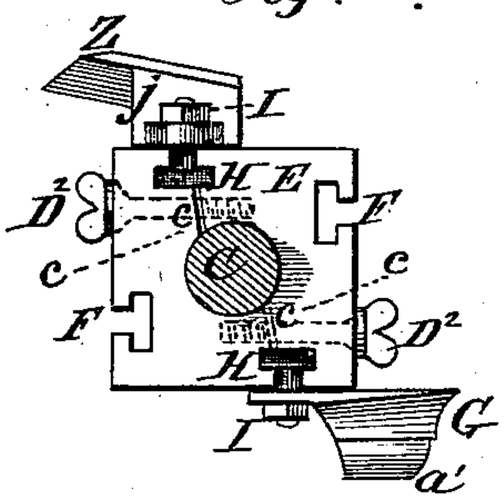


Fig. 6.

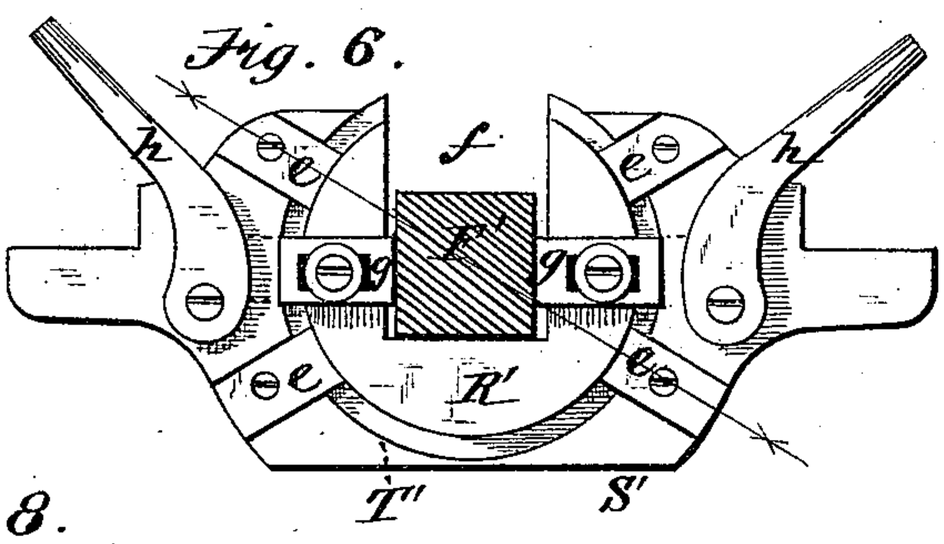
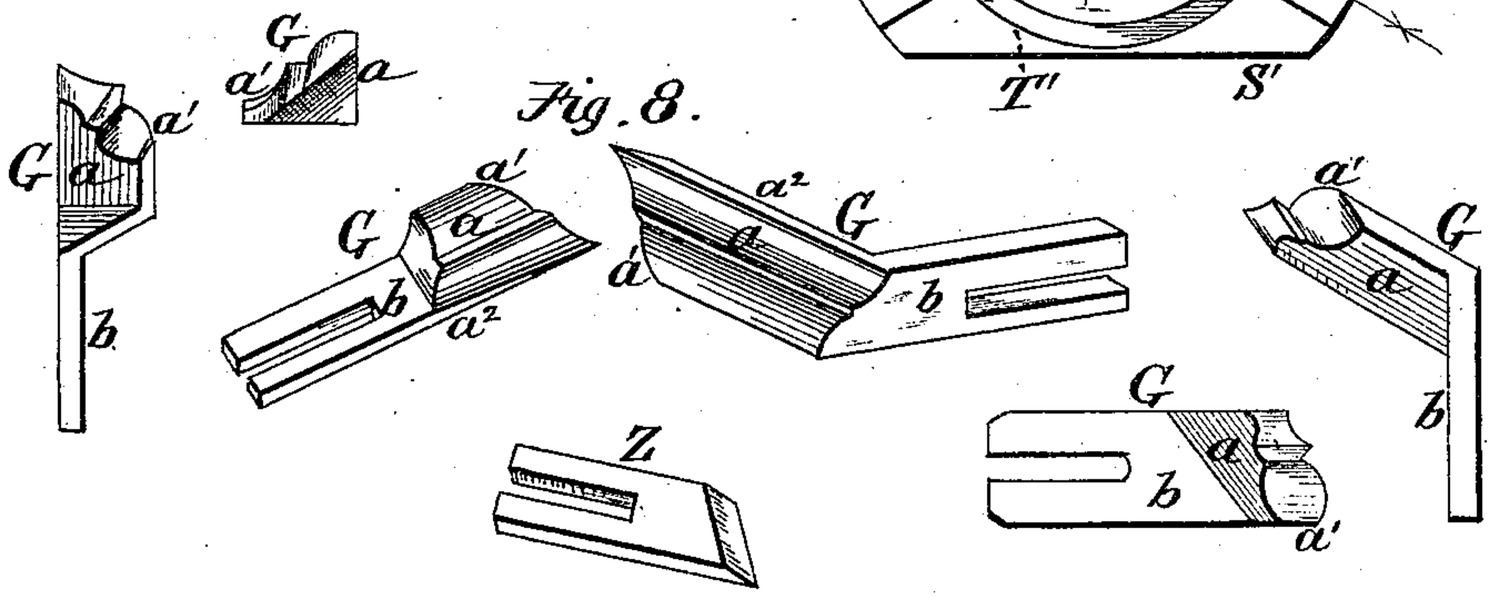


Fig. 8.



Attest.
W. H. H. Knight.
Floyd Harris.

Inventor,
Philip M. Haas
by Johnson & Johnson
Attys.

UNITED STATES PATENT OFFICE.

PHILIP M. HAAS, OF WARREN, OHIO.

MACHINE FOR TURNING BALUSTERS.

SPECIFICATION forming part of Letters Patent No. 226,912, dated April 27, 1880.

Application filed August 21, 1879.

To all whom it may concern:

Be it known that I, PHILIP MELANCTHON HAAS, of Warren, in the county of Trumbull and State of Ohio, have invented certain new and useful Improvements in Machines for Turning Balusters and other articles; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

I have made certain improvements in machines for turning balusters, piano-legs, and similar articles, and in which the work is carried by an over-traversing frame, and is supported in the middle of its length by an improved clamp device, which holds the work firmly against the action of under-revolving cutters, and at the same time permits it to be revolved to any desired position for the action of the cutters. This intermediate clamp or work-support consists of a revoluble disk seated in a cross-piece of the carriage, and has a circumferential opening to allow the work to be placed in said opening from the top in securing said work between the carriage-centers. The cross-piece has an opening corresponding to the circumferential opening in the revoluble disks, to allow of such top-placing of the work, while said disk-support is provided on its outer face with dogs adapted to be clamped horizontally against the opposite sides of the work. This construction allows the opening in the disk-support to be large enough to receive articles of different sizes, and to be clamped therein by the adjustable dogs, which are forced into such clamping positions by means of hand cam-levers pivoted to the cross-piece in which the disk-support is seated, and adapted to act upon the outer ends of said dogs.

The side cutter-heads are carried beneath the work-carriage, and each has end splits extending from two opposite sides to the center opening, and clamp-screws pierce said split ends from opposite sides of the head and on opposite sides of the shaft, whereby said cutter-heads are made adjustable in relation to each other and to the work, and clamped at both ends alike upon the shaft.

The cutters are secured within longitudinal side grooves in the cutter-head in a manner to admit of their adjustment in the line of the shaft and at right angles thereto, which, in connection and co-operation with the adjustable cutter-heads, gives every capacity for adapting the same machine for different styles and kinds of work.

I use a molding-cutter in which the part a', making the deepest cut, does not lead, but is the last cutting part as the cutter revolves, and by which a smooth cut across the grain is obtained. In this particular the cutter has a novel construction, in which the cutter part proper, a, stands out in a lateral oblique relation to the face of the shank, and, in connection with the oblique cutting-edge, forms the part which is farthest from the center of rotation, cuts the deepest part of the molding, and follows the advancing point, so that the part which stands out obliquely from the shank will stand oblique to the line of the driving-shaft. This lateral oblique cutter part is shown in the left-hand views of Figure 8, in which the lateral projection rises from the longest edge, a^2, of the shank on an incline to its shortest edge, while in the right-hand views of said figure the cutter part stands at an obtuse angle to the shank, somewhat in the form of the letter L, in which case the cutter part stands on a slant or bevel edgewise with the shank, so as to bring the highest part, a', at the shortest side of the cutter part. In either case the cutter part will stand oblique to the line of the driving-shaft.

The cutter-heads are arranged to operate on each side of the intermediate work-support, and to prevent their vibration under the action of the cutters I arrange a cross-bearing in the frame beneath and in vertical line with the work-support, whereby both the work and the cutter-heads are supported and braced against vibration, so that there is a co-operative relation between these supports in producing perfectly smooth and true work.

Both the work-supporting centers are adjustable, the one to suit different lengths of work, and forming the driving-mandrel, and the other for clamping the work between the centers, the operating device for which consists of an eccentrically-slotted hand-lever, which not only serves to move the center in

and out, but to hold it against the end of the work.

In the accompanying drawings, Fig. 1 represents a front elevation of a machine for turning balusters and other articles embracing my invention. Fig. 2 is a top view thereof. Fig. 3 is an end elevation, showing the mechanism for adjusting the ways on which the over-traversing frame travels. Fig. 4 represents a cross-section of the machine, showing the clamping device for supporting the baluster at its center. Fig. 5 represents a section of the baluster clamping and supporting device; Fig. 6, a side view of the same with the baluster clamped in place; Fig. 7, a cross-section, showing one of the cutter-heads, and Fig. 8 the cutters in different positions.

A frame, A, is constructed of any suitable material, and provided with bearings B B′, in which is journaled a shaft, C, provided with a pulley, D, at one end, by means of which rotary motion may be imparted to it by a suitable belt. Upon said shaft, and on each side of its central bearing, B′, are mounted two cutter-heads, E, consisting of rectangular metallic blocks, in each face of which is formed a longitudinal groove, F, which is T-shaped in cross-section and near the angle, as shown in Fig. 7.

The cutters G, which correspond in configuration to the portions of the baluster to be cut, are secured in said grooves by means of square-headed bolts H, the heads being placed in the groove and the shanks passing through a slot in the cutter, which is secured thereto by means of screw-nuts I.

It will be perceived that by this construction the cutters can be readily adjusted longitudinally, or removed and replaced by other cutters of different form when desired and may also be adjusted crosswise to increase or diminish the diameter of the article to be cut.

The said cutters are of peculiar construction in being adapted to cut across the grain of the wood with a smooth paring-cut, and in which the part making the deepest cut does not lead, as in other cutters of the kind, but is the last acting part as the cutter revolves. For this purpose the cutter part *a* is made oblique to the shank *b*, and with a diagonal cutting-edge, the said oblique part being formed with a molding on its outer side, corresponding to that to be formed on the article, so that as the cutter is sharpened from the inner side the molding form will be preserved until the cutter part is sharpened away to its oblique joining of the shank. This oblique cutting part may stand out from the shank equally from one edge of the shank to the other, as in one form shown in Fig. 8, or it may stand out from one edge only, leaving one point of the cutter in line with the shank, as in another form shown in Fig. 8; but in either form the relation of the cutting part to the shank is such that the shortest edge, *a′*, of the oblique part stands up the highest from the shank and the cutter-head as it revolves against the work and cuts the deepest part of the molding, and is by such construction, in connection with the diagonal cutting-edge, made the last cutting part, and not the entering part of the cutting-edge, and therefore is adapted to cut across the grain with a shaving or paring cut, and by which a smooth cut is obtained, so that there is no necessity for the use of polishing devices to produce the desired finish.

This construction of cutter gives the best results, and, so far as I know, is the only cutter adapted to cut across the grain in turned work, and in which the highest point of the cutter stands back of the leading or advancing point, for the purpose stated.

The cutter-heads E are split on opposite sides down to the central opening and from each end longitudinally about half-way of their length down the grooves, as shown in Fig. 7, and are clamped on the revolving shaft by means of set-screws D^2, which are secured in the cutter-head at the split portions, so as to draw them together when the screw is tightened and allow of their adjustment.

A traveling carriage or over-traversing frame, K, is mounted upon ways L L at opposite ends of the machine.

As the carriage travels over the cutters it is necessary that it should have means for elevating and lowering it with respect to said cutters for different diameters of balusters and to hold said carriage when so adjusted. For this purpose the ways are provided with inclined planes M, with which similar inclined planes N on slide-bars O act by adjusting said bars from one side of the machine to the other by set-screws P, which are screwed into the frame A. In this manner the proper adjustment can be given to the carriage, after which the ways are clamped fast by screws R, passing through slots in them into the frame A, as shown in Fig. 3, and as in my patent of March 6, 1877.

To adjust the carriage the ways L must be first unclamped, and by turning the set-screws to the right or left the ways will be raised or lowered the desired degree.

A mandrel, A′, is journaled in a bearing, B^2, at one end of the traveling carriage, and a bearing in a cross-bar, D′, which is adjustable longitudinally upon the frame, so that the mandrel may be adjusted to adapt the machine to cut balusters of different lengths, the mandrel being capable of a longitudinal movement in the bearings for the purpose. The forward end of said mandrel is provided with projections, by which the base of the baluster F′ is chucked and held. The said mandrel has mounted upon it a wheel, G′, having a series of apertures in its periphery, with which a pin on a spring, K′, is adapted to engage, whereby the baluster may be shifted and held in any desired position to adapt the machine to cut polygonal balusters, or to be rotated by the pulley *z* to cut cylindrical work.

A mandrel, L′, is mounted in bearings M′ and N′ at the opposite end of the traveling carriage and capable of a longitudinal motion in said bearings. The rear of said mandrel is provided with an upwardly-extending adjustable arm, O′, which sets in a cam-groove, *d*, in the lever P′, which is mounted upon the traveling carriage, and serves to operate said mandrel to advance it to or withdraw it from the end of the baluster, for the purpose of centering or removing the same.

The clamping device or support for the central portion of the baluster consists of a flanged or rimmed disk, R′, secured in a circular recess, T′, or rimmed way in the face of a suitable cross-piece, S′, secured to the traveling carriage. The said flanged disk is confined in the recess T′ by means of short plates *e*, secured to the cross-piece S′, and extending over the flange or rim on the disk. (See Figs. 5 and 6.) Said disk is provided with a rectangular opening, *f*, for the reception of the central portion of the baluster, and the cross-piece is cut away on one side, at *f′*, (see Fig. 5,) to permit the baluster to be inserted in the open seat of said clamp. At opposite sides of the open clamp-seat are located the dogs *g g*, which are secured to the face of the disk by screws passing through slots in the said dogs.

At each side of the dogs, secured to the cross-piece, are levers *h h*, which have cam-bearing surfaces, which can be brought against the dogs, in order to securely clamp them against the central portion of the baluster, said dogs being then secured by means of the screws passing through the slots, so as to hold the baluster firmly in whatever position it may be turned in the central support.

It will be perceived that by means of the support for the central portion of the baluster the same will be rigidly and firmly held to the cutters while being turned, relieving it of all jar and enabling it to be turned much smoother than when supported only at the ends. The central portion and the ends which are left uncut are subsequently finished up in any convenient manner.

The carriage may be moved over the ways by hand, or it may be operated by a lever or otherwise.

The capacity of the machine for holding and revolving the work to be turned gives the important advantage of adapting the same machine for different kinds of work, and in which the article is supported by a clamping device, which may be either fixed in its relation to the carriage and the work or revoluble in relation thereto, in which latter case the mandrel A′ is rotated by the pulley *z* in any suitable manner that will allow of the proper movement of the carriage.

In my patent of March 6, 1877, No. 188,126, an arrangement of belting is shown in connection with a take-up for the slack occasioned in the belt by the movement of the carriage; but such belting is only required when it is desired to cause the work to rotate as well as the cutters. When this is the case the spring-arm K′ is disengaged from the wheel G′, and the clamp and support for the baluster revolve together, so that whether the article being turned is caused to revolve or not it is supported centrally between its centering-mandrels by the clamp. When the work does not revolve it is held by the spring-arm K′, and the clamping-support is held with it.

The shaft of the separate cutter-heads is supported centrally between them by the cross-bearing B′ of the frame, while the work is supported between the cutters by a cross-bearing of the carriage, thus giving to these moving parts a very firm and steady action, which is so important to produce good work.

The mandrel L′ is made adjustable in relation to the arm O′, which connects with the eccentric lever P′, to suit different lengths of work, and the lever extending to the front of the machine allows the operator to control this device quickly and easily from where he stands at work.

The cutter Z, for turning the cylindrical part of the article, is of the usual construction; but it is secured to a seat-piece, *j*, which is secured in the cutter-head grooves by square-headed screws.

The cutters may be used in each of the side grooves, F, or only in some of them, as may be required.

The construction of the cutter-heads gives an important advantage in allowing them to be set and clamped in the required position, and this adjustment, in connection with the adjustment of the cutters in the grooves of the cutter-heads and crosswise thereof, gives every facility for placing the cutters to suit the work.

By having both the centers adjustable different styles and lengths of work can be turned, and the opening *f* in the intermediate disk-support is large enough to suit different thicknesses of work, the slotted dogs *g g* being arranged horizontally on the outer face of the disk R′, so as to clamp the work on opposite sides.

In combining the dogs with the disk-support they revolve with it, and are adapted to clamp the work at any part, whether angular or cylindrical.

In Fig. 7 one of the split ends of the cutter-head is shown, in which the splits *c* extend from the bottom of the opposite side grooves, F, to the center opening, so that the cutter-heads are thus clamped at both ends alike upon the shaft by the screws D^2, which are arranged so as not to interfere with the side arrangement of the cutters.

This construction provides an easy means for adjusting and holding the cutter-heads upon the shaft.

The driving-mandrel A′ is secured to the cross-bearing D′ by the collars *e e*, Figs. 1 and

2, so that said mandrel can only be adjusted to suit different lengths of work by moving said cross-bearing, which, by its lap ends, embraces the carriage sides, and is secured by screws in the holes c' c' in the carriage sides. (Shown in Fig. 2.) For this purpose the mandrel is made long enough to allow it to be moved endwise in the outer bearing, B^2. (Shown in Fig. 1.)

The center shaft, L′, holds the work against the mandrel A′, the pressure being borne by the cross-bearing D′, and the form of the eccentric slot *d* in the hand-lever P′ is such as to hold said center shaft against the work.

Turning-machines have been provided with an intermediate work-support, made open to admit the work, and within which the work is revolved. A flanged revoluble bush has also been used for this purpose, within which the work is inserted endwise between the centers. Grooved side cutter-heads have also been used with adjustable cutters; so, also, cutters have been made with various forms of angular and oblique cutting-edges, to obtain a smooth cross-cut, and it is only the specific matters of improvement which I claim in these particulars, and which render the machine more effective and complete.

I do not claim in this patent the subject-matter embraced specifically in the cutter and the cutter-head, as such matter forms the subject of a separate patent.

I claim—

1. In a machine for turning balusters and the like, the combination, with the intermediate work-support, consisting of a revoluble and a fixed part, of dogs *g g*, carried by said revoluble part and adapted to be clamped directly upon the work, substantially as herein set forth.

2. The combination, with the intermediate work-support, consisting of a revoluble and a fixed part, and the dogs *g g*, carried by said revoluble part, of the hand cam-levers *h h*, carried by said fixed part S′, whereby said dogs are clamped directly upon the work and secured by screws, substantially as herein set forth.

3. The revoluble part R′ of the work-support, having the opening *f* therein formed by parallel sides extending from the circumference thereof, and having the work-clamping dogs *g g* at said parallel sides in line horizontally with the center of said part, whereby to form, in connection with the vertical opening *f′* in the fixed part, a circumferential way, *f*, capable of being turned upward to bring said way and the acting ends of the dogs opposite the opening *f′*, in combination with the centers of the carriage, whereby the work is placed upon its centers and within said revoluble part, and removed therefrom while said revoluble part maintains its connection with said fixed part, substantially as herein set forth.

4. In a machine for turning balusters and the like, an intermediate work-support, consisting of a revoluble disk, R′, having the circumferential opening *f*, the cross-support S′, having the opening *f′*, the work-clamping dogs *g g*, secured to said disk, and the dog-operating levers *h*, all constructed for use substantially as herein set forth.

5. As a means for shifting the work-supporting center L′ and holding the work against the mandrel, the adjustable arm O′ on said center, in combination with the hand-lever P′, pivoted to the carriage in line with the center, and having the eccentric slot *d*, into which said adjustable arm connects, as shown and described.

6. The carriage K, having a revoluble support for the work, and the centers A′ L′ for the work, one of which is adjustable with and by the cross-bearing D′, and the other adjustable by the arm O′, and the cam-slotted lever P′ *d*, in combination with the adjustable cutter-heads, whose shaft is supported at a point coincident with the intermediate work-support and between cutter-heads operating on each side of the said work-support, whereby both centers and cutter-heads are adjusted longitudinally for different lengths of work, and both the work and the cutter-head shaft are supported and braced against vibration, substantially as herein set forth.

In testimony that I claim the foregoing I have hereto affixed my signature in the presence of two witnesses.

PHILIP M. HAAS.

Witnesses:
P. A. CALDWELL,
S. F. BARTLETT.