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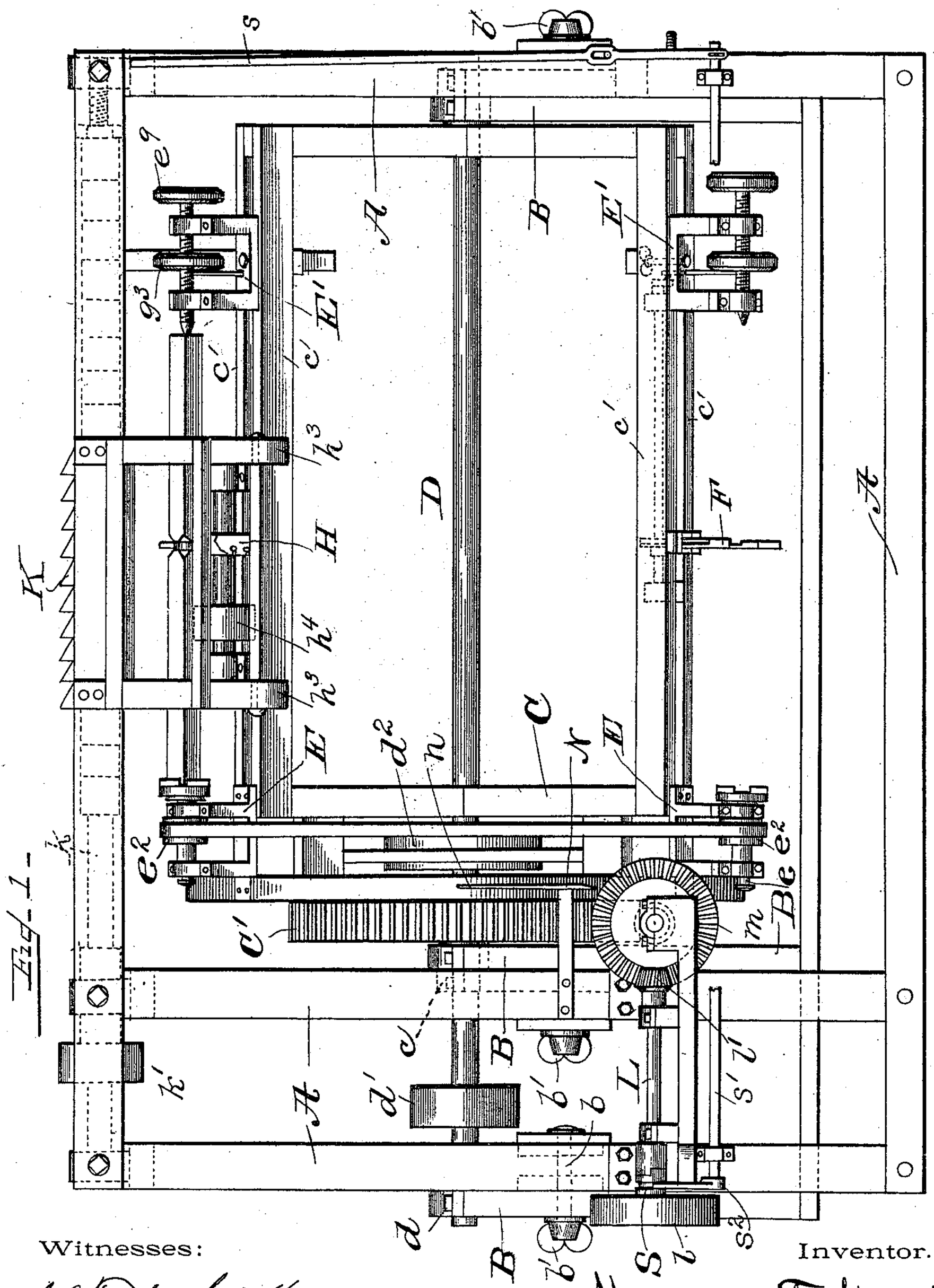
W. T. WOOD.

LATHE.

No. 523,825. Patented July 31, 1894.



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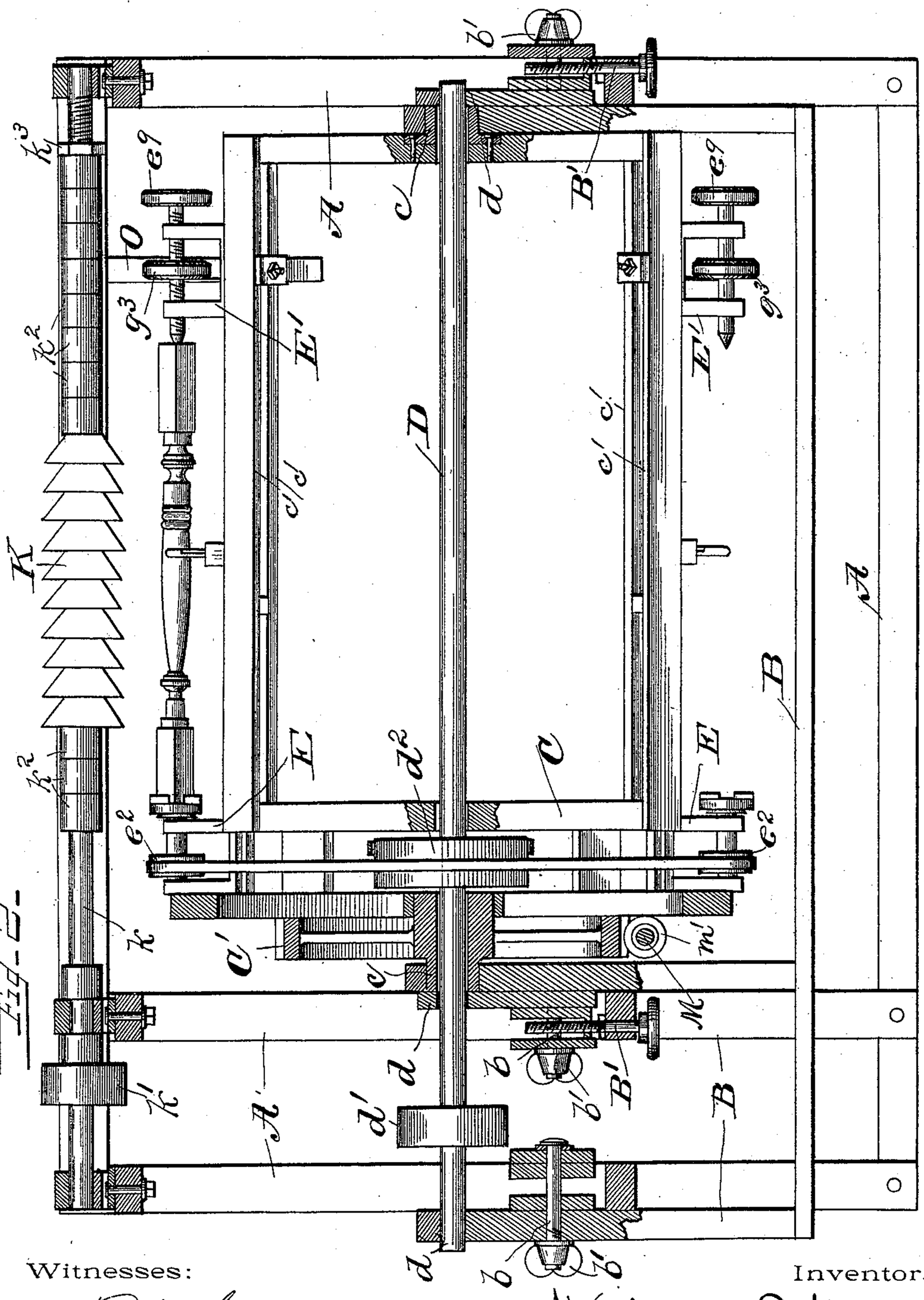
(No Model.) 4 Sheets—Sheet 2.

W. T. WOOD.

LATHE.

No. 523,825. Patented July 31, 1894.



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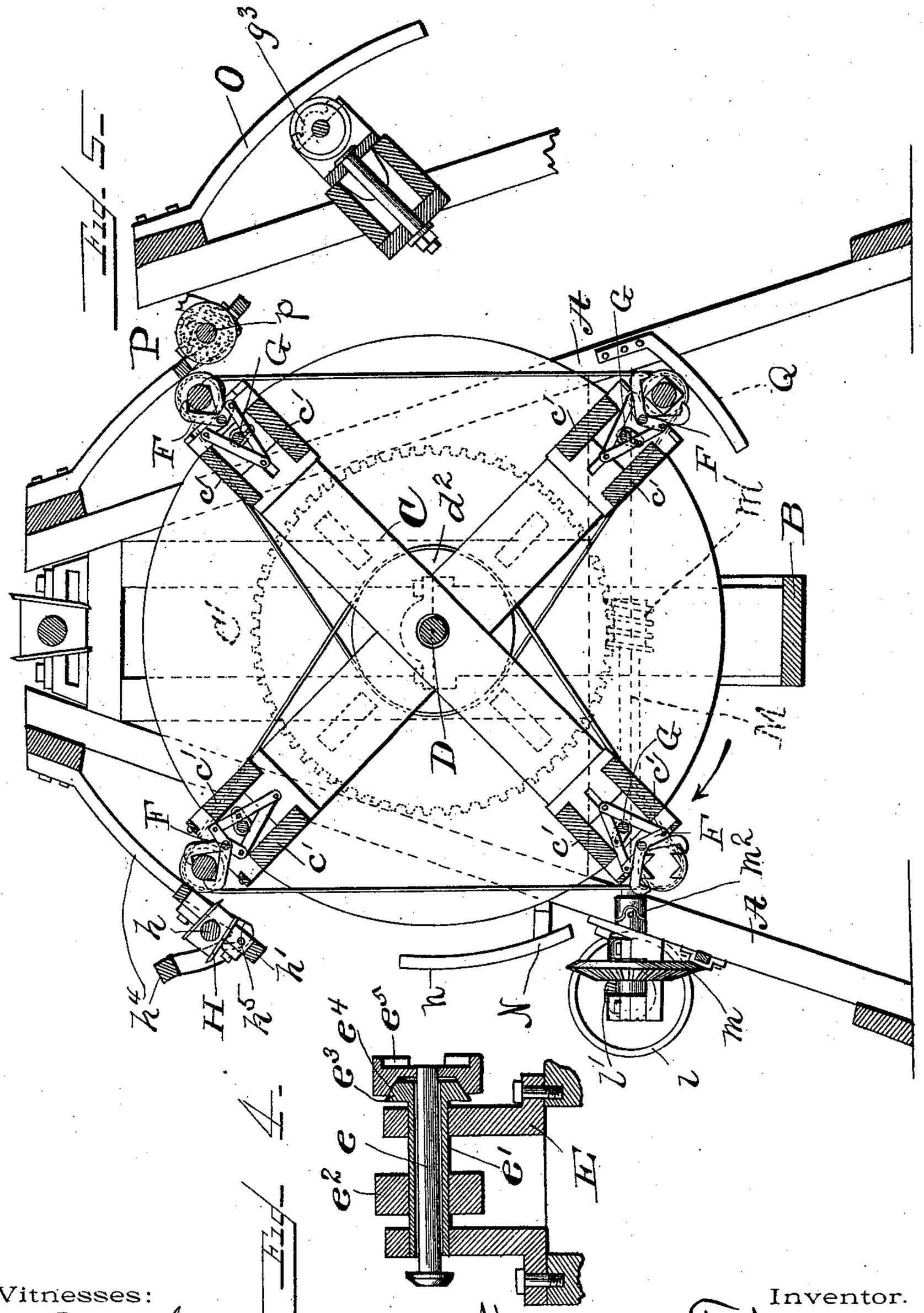
(No Model.) 4 Sheets—Sheet 3.

W. T. WOOD.

LATHE.

No. 523,825. Patented July 31, 1894.



Witnesses:

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(No Model.) 4 Sheets—Sheet 4.

W. T. WOOD.

LATHE.

No. 523,825. Patented July 31, 1894.

Fig. 6.

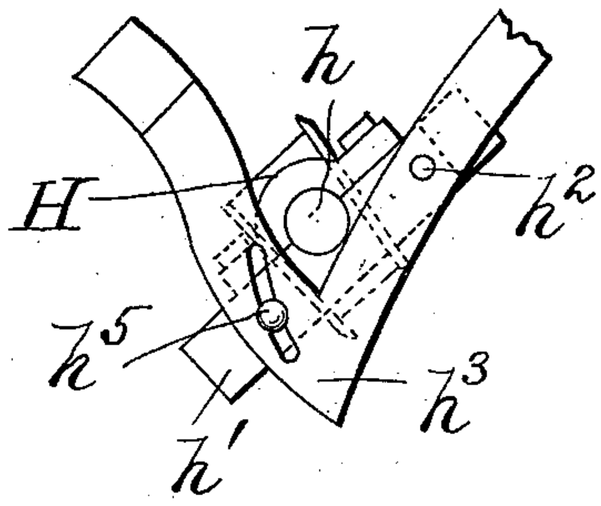

Fig. 7.

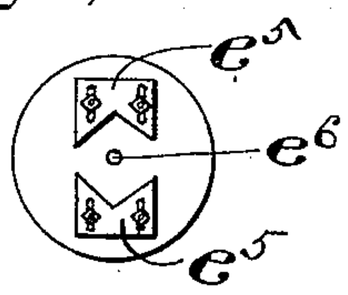

Fig. 8.

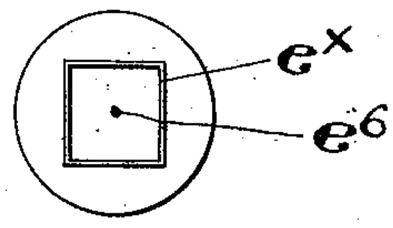

Fig. 9.

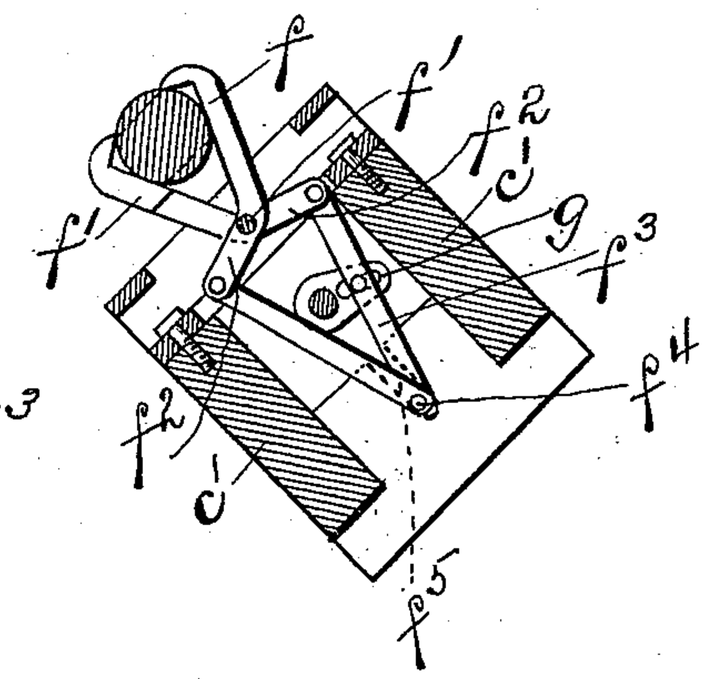

Fig. 10.

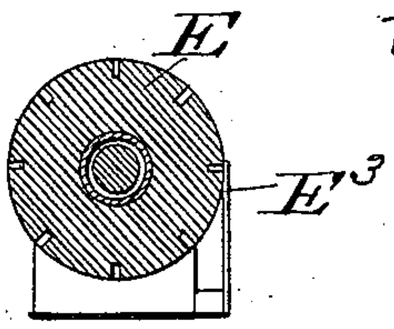

Fig. 11.

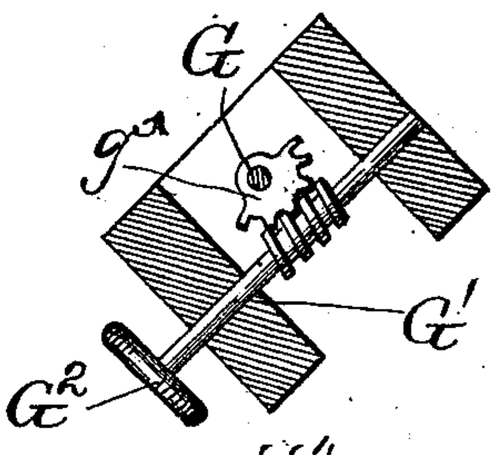

Fig. 12.

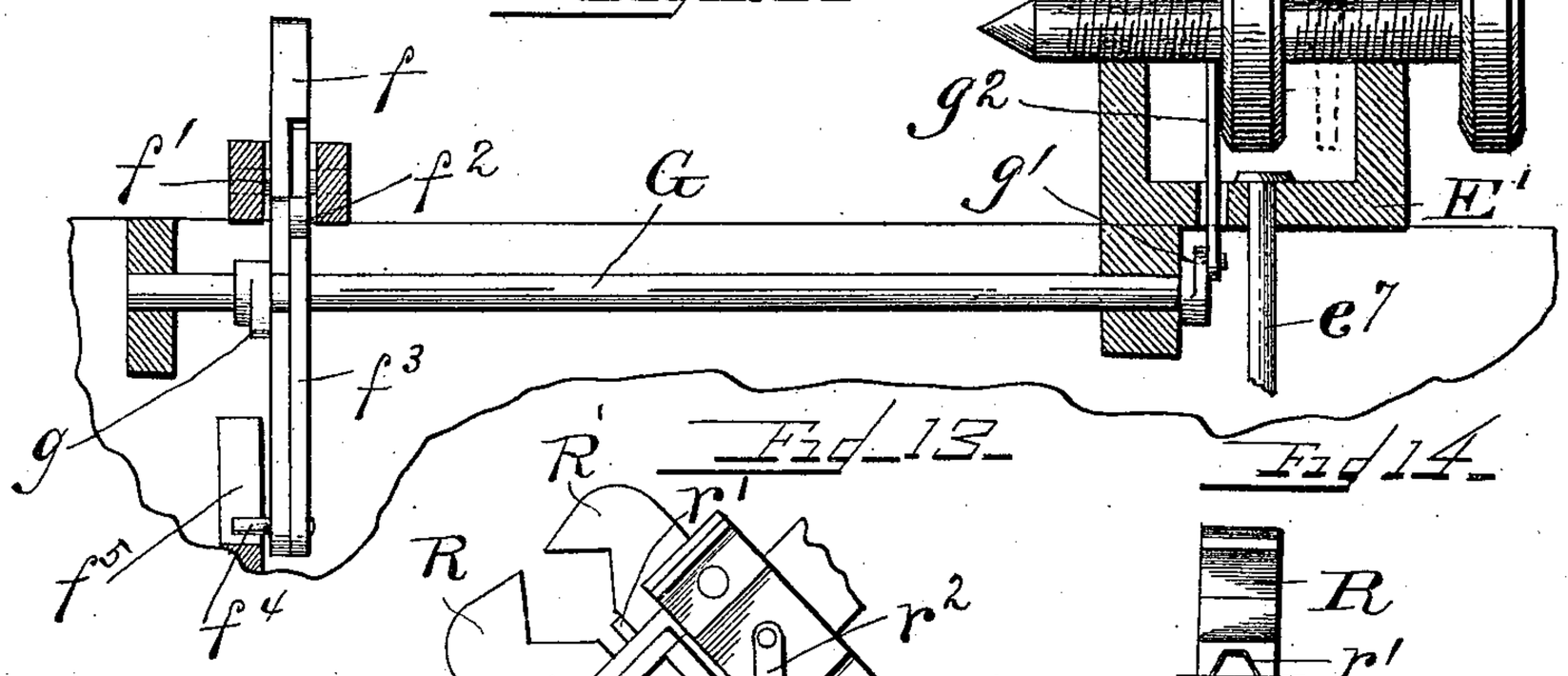

Fig. 13.

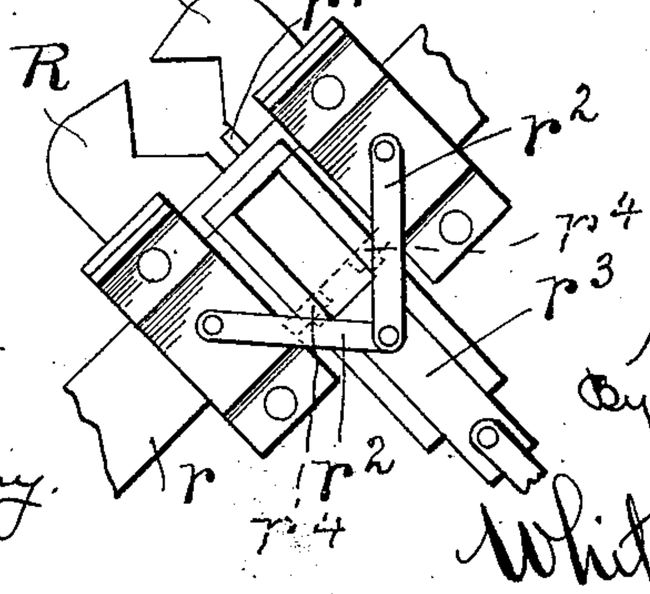

Fig. 14.

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UNITED STATES PATENT OFFICE.

WILLIAM T. WOOD, OF WASHINGTON, DISTRICT OF COLUMBIA.

LATHE.

SPECIFICATION forming part of Letters Patent No. 523,825, dated July 31, 1894.

Application filed March 10, 1894. Serial No. 503,176. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. WOOD, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Lathes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is an improvement in lathes for turning balusters and like articles and it consists in the novel features of construction and combination of parts hereinafter fully described, reference being had to the accompanying drawings which illustrate one form in which I have contemplated embodying my invention and said invention is fully disclosed in the following description and claims.

Referring to the said drawings, Figure 1 represents a front elevation of a lathe constructed according to, and embodying my invention. Fig. 2 represents a central vertical longitudinal section of the same. Fig. 3 represents a central vertical transverse section of the lathe. Fig. 4 is a detail view of one of the head stocks of the lathe. Fig. 5 is an enlarged view of the device for automatically releasing the tail stocks. Fig. 6 is a detail view of the mechanism for adjusting the auxiliary cutter. Figs. 7 and 8 are views of two forms of chucks for the lathe head stocks. Fig. 9 is an enlarged view of the steadying rest for engaging the work intermediate the head and tail stocks. Fig. 10 is a view illustrating a modified form of pulley for use in making polygonal work. Fig. 11 represents a modified form of device for operating the steadying rest. Fig. 12 is an enlarged elevation partly in section, of one of the tail stocks, and steadying rest, showing the mechanism for operating said rest. Fig. 13 is a view showing a modified form of steadying rest. Fig. 14 is an elevation showing one of the jaws of the steadying rest shown in Fig. 13, and the cutter attached thereto.

My invention relates to lathes in which the work is held in suitable head and tail stocks and carried past a revolving cutter which is constructed to turn the entire article when brought into contact with it. In this class of devices it has been very difficult heretofore to prevent the work from being wrenched out of the supports, or head stocks.

My invention contemplates the use of one or more steadying rests for grasping the work between the head and tail stocks, and auxiliary cutters for grooving the work to enable the steadying rest or rests to grasp the work before it is brought into contact with the main cutters, and my invention also embodies other novel features which will be hereinafter fully described.

In the drawings I have shown a many spindle lathe adapted to turn balusters, but it will be apparent that it could readily be adapted to turn other kind of work if desired. I have shown a series of lathe head stocks mounted upon a revolving drum or frame, but it is obvious that the said stocks might be mounted on a reciprocating frame moving in a straight line past the cutter without departing from the spirit of my invention.

In the form of machine shown A represents the main frame of the machine, constructed to support the various parts of the apparatus.

B represents an auxiliary adjustable frame, which carries the revolving drum and which is adjustable toward and from the cutter, which is supported in the main frame A.

It is obvious that I might have the cutter adjustable with respect to the drum if desired but I prefer to have the cutter shaft supported in a very rigid manner as it is subjected to considerable strain in the operation of the machine.

C represents the revolving frame or drum that carries the work past the cutter head. This frame or drum is provided with hollow sleeves *c c* at its ends which are journaled in bearings in the auxiliary frame B, as shown, and in this instance I have shown one of these sleeves *c* provided on the hub of a large gear wheel C′ secured to the drum or frame, as shown in Fig. 2 for driving the same. A central shaft D extends loosely through the said sleeves *c c* and through the drum, and is journaled in bearings *d d* in the auxiliary frame B outside of the bearings for said sleeves, so that the steady movement of the drum will not be influenced by the jar of this central shaft D which is driven with great

rapidity. This central shaft is provided with a pulley d' by which it may be driven from a suitable counter shaft.

The main frame A is provided at each end with a pair of parallel vertical standards, between which guiding blocks secured to the auxiliary frame B slide, and adjusting screws B′ B′ are provided as shown in Fig. 2 for engaging nuts secured to the auxiliary frame and raising and lowering the auxiliary frame, to adjust the apparatus for cutting balusters of different diameters.

In order to hold the auxiliary frame rigidly in position when adjusted, I prefer to provide the bolts b b and wing nuts b' b' which engage blocks on either side of the vertical standards before referred to and may be screwed up to clamp said standards rigidly to secure the parts in position, after they have been adjusted.

The frame or drum C is provided at suitable intervals with parallel bars c' c' to each pair of which are secured the head stock E and the adjustable tail stock E′. In Fig. 4 I have shown an enlarged sectional view of the form of head stock which I prefer to use and a similar view of the tail stock is shown in Fig. 12. I have shown the revolving drum or frame C provided with four sets of head and tail stocks but I may use less or more as found most effective.

Referring to Fig. 4 it will be seen that the head stock is provided with a chuck for receiving one end of the work, the said chuck being secured to a spindle e extending loosely through a sleeve e' and movable longitudinally therethrough. The spindle e is mounted in bearings and is provided with a pulley e^2 for receiving motion from the central shaft D and also with a cone e^3 which engages a cone shaped recess e^4 in the rear face of the chuck.

In Fig. 7 is shown the form of chuck which I prefer to employ in turning balusters or other articles having square or polygonal ends. It consists of two plates e^5 e^5 each having an angular notch to engage a corner of the work, and secured to the chuck plate by screws passing through slots in said plates to enable them to be adjusted for articles of different sizes. A central stud or center e^6 is also used to center the work in the usual manner.

In Fig. 8 is shown a form of chuck or center for work which is not trued before being placed in the lathe. This consists of a knife edge $e^\times$ in the form of a hollow square, having the usual center point, or stud, as in the other form of chuck. Both these forms of chuck hold the work securely and do not split the wood.

The tail stock E′ is secured adjustably in place by means of a bolt e^7 and nut in the usual manner, and is provided with the usual centering screw e^8 and hand wheel e^9 for adjusting the same.

The steadying rests F are secured to the parallel bars c' c' intermediate the head stocks and consist of a pair of opposing angular shaped jaws f f pivoted on a pin f' and provided below the point of pivoting with arms f^2 f^2 as shown in Fig. 9. In order to secure the simultaneous movement of the two jaws f f, the arms f^2 f^2 are preferably connected by links f^3 f^3 to a pin f^4 moving in a vertical slot f^5 in the frame, one of said links having a pin engaging a slotted crank arm g, on a rock shaft G running longitudinally of the parallel bars c' c' as shown in Fig. 12. In order to rock the shaft G, I provide the outer end of the shaft G with a crank g' connected by a link g^2 to a crank pin on a wheel g^3 having a screw threaded central aperture to engage the screw threaded center e^8 of the tail stock. By turning the wheel g^3 the rock shaft G will be rotated to cause the jaws f f of the rest to grip the work.

I may employ a jam nut g^4 to hold the wheel g^3 in position if the frictional engagement of said wheel with the screw is not sufficient, as shown in dotted lines in Fig. 12.

In order to have the steadying rest F engage a rounded portion of the work, I provide an auxiliary cutter to form a groove in the work to receive the steadying rest before the work passes to the main cutter.

One form of auxiliary cutter is shown in Figs. 1, 3 and 6 in which a rotating cutter H is shown, mounted upon a shaft h, supported in a bracket or hangers, from the main frame A of the machine. The shaft h is mounted in a pivoted frame h' as shown in Fig. 6, pivoted at h^2 and provided with adjusting screws h^5 passing through slots in the hangers h^3 for adjusting the cutter H with respect to the work. The shaft h is also provided with a pulley h^4 by means of which motion is imparted to the cutter H.

Adjacent to the top of the main frame A the cutter shaft k, which carries the main cutters K, is journaled in suitable bearings, and is provided with a driving pulley k'. The cutters are secured to a series of cutter heads mounted on the shaft k, and as many cutters will be employed as are needed to form the pattern desired. I prefer to provide the shaft with a number of collars k^2 which are placed at each side of the cutter heads and a screw collar k^3 is then turned up on a screw threaded portion of the shaft to clamp the cutter heads rigidly in the shaft. By this means the cutter heads may be very easily adjusted and any number of them may be employed which are necessary to produce the pattern desired.

The central shaft D is provided with a pulley d^2 which has a broad face in line with the pulleys e^2 of the several lathe head stalks. I prefer to belt these head stalk pulleys as shown in Figs. 2 and 3 by passing a belt around the pulley d^2 and two of the pulleys e^2 and another belt around another portion of the pulley d^2 and around the other two pulleys e^2 which will be located in a different vertical plane from the other two. In this way rapid motion will be imparted to the

lathe spindles from the rapidly revolving central shaft D.

The drum or revolving frame C is rotated more slowly by the following mechanism: A short shaft L is supported on the main frame A of the machine and provided with a driving pulley *l* and a bevel pinion *l'* gearing with a bevel wheel *m* on a shaft M provided at its rear end with a worm *m'* meshing with the large gear wheel C' which is secured to the revolving frame or drum C. The shaft M is provided with a universal joint m^2 intermediate its ends to allow the worm *m'* which is supported upon the auxiliary frame B to be adjusted up and down with said frame.

I prefer to connect the pulley *l* with the shaft L by means of a clutch S as shown in Fig. 1 and I provide a clutch lever *s* for operating said clutch, the said lever being connected with the clutch by a sliding rod *s'* provided with an arm s^2 engaging a groove in the movable clutch member.

Referring particularly to Fig. 3, of the drawings the operation of the machine is as follows: The lathe head and tail stocks at the lower left hand corner of Fig. 3 is empty and as they are moved upwardly in the direction of the arrow the end of the spindle *e* (see Fig. 4) will strike a cam N secured to the frame of the machine and force the said spindle inward, disconnecting the cone shaped portions e^3 e^4, so that one end of a baluster blank or other piece of work can be placed in the chuck the other end being held in position to be engaged by the screw center e^8 of the tail stock. I prefer to have the pieces of wood to be operated on, marked and indented previously so that they can be instantly placed in the lathe. The upper portion *n* of the cam N is of spring material and as the screw center e^8 is screwed up by turning the wheel e^9 the said spring portion *n* gradually yields, allowing the spindle *e* to be forced outwardly so as to bring the parts of the cone clutch together. The sleeve *e'* of the head stock is being driven continuously from the central shaft D so that as soon as the work has been secured in position the cone clutch will cause it to be rapidly revolved with the sleeve *e'*. The continued movement of the drum C carries the revolving piece of wood under the revolving cutter which cuts a groove for the reception of the steadying rest F which is then quickly adjusted by the operator to grasp the work firmly, by turning the wheel g^3 and the operator will then place a blank in the next head stock and so on. The steadying rest grasps the work firmly both above and below its center so as to hold it from vibrating as it passes the main cutters and also to hold it from being wrenched out of the head and tail stocks by the drawing action of the revolving cutters.

It will be seen that the distance between the opposite work engaging portions of the jaws of the rest, is less than the diameter of the portion of the work engaged by the rest as indicated in dotted lines in Fig. 9, hence the work is held securely against being wrenched or drawn out of the jaws by the cutters.

As will be seen in Fig. 9 the jaws of the rest are so shaped that the work projects above them so as not to interfere with the main cutters, which cut the wood on either side of the groove made by the auxiliary cutter down to or nearly to the thickness of the part engaged by the rest. In the latter case the part engaged by the rest will form a groove or ring which may form a part of the pattern. After the work has been carried past the cutters the steadying rest is thrown out of operation so that the work may be sand-papered, oiled or finished in any desired way before it is discharged from the machine. I have shown a device for accomplishing this automatically in Figs. 1 and 5 which consists of a friction strip O secured to the main frame in the path of the wheel g^3 for adjusting the steadying rest. The wheel g^3 is preferably covered with rubber or other material to form a friction surface and as it engages the cam O said wheel will be rotated to throw off the jaws *f f* of the rest.

In Fig. 3 I have shown a bracket or hanger for supporting a shaft *p* provided with a series of flexible sand paper disks P for polishing the work as it is carried past by the drum, but this may be done by hand if desired. After the turned work has been polished it can be removed from the centers by hand, or I may provide a friction strip Q similar to the cam O located as indicated in dotted lines Fig. 3, for engaging the wheels e^9 of the tail stocks (which may also be covered with rubber) and releasing the work which will fall out of the centers so as to allow another blank to be inserted as they come around to the front of the machine again.

In Fig. 11 I have shown a modified form of operating means for the rock shaft G for operating the steadying rest, which consists of a screw segment g^5 secured to the rock shaft G and a worm shaft G' for operating the same, provided with a hand wheel G^2. This hand wheel can be faced with some friction material and operated by a stationary friction strip in the same manner as before described with reference to the form previously described. In Figs. 13 and 14 I have shown a slightly modified form of steadying rest, in which the auxiliary cutter is fixed to one of the jaws of the rest, and cuts the groove for the rest as the jaws are advanced upon the work. In this form of rests *r* represents a cross bar supported between two of the parallel bars *c' c'* of the frame or drum.

R R' represent the two jaws having angular recessed portions to engage the work, said jaws having recessed portions sliding upon the cross bar *r* and *r'* represents the auxiliary cutter secured to the jaw R' in position to cut the groove for the jaws R R'. The two sliding jaws are connected by links r^2 r^2 to a vertically movable slide r^3 which is operated

by a crank from the rock shaft G as before described with reference to the other form of rest. In order to regulate the depth of the groove cut by the knife r' so that the diameter of the work shall always be the same, at that point, I provide the under side of the cross bar r with a pair of adjustable stops r^4 r^4 shown in dotted lines in Fig. 13, which are held in place by screws or bolts passing through slots in said stops, to allow for their adjustment. These stops may be set to arrest the jaws and consequently the cutter at any desired point, as will be readily understood.

The apparatus can also be adjusted very readily for use in turning polygonal forms by providing each of the sleeves e' of the head stocks with a wheel E^2, a series of holes and a spring catch E^3 for securing said wheel and the sleeve in any desired position, as is usual in lathes for turning polygonal forms and as shown in Fig. 10. The operation will be the same as that previously described except that before a baluster can be removed it must pass as many times beneath the main cutting knife as there are sides to be of polygonal form which is desired.

While I have shown but one steadying rest for each head stock, it is obvious that I may employ two or more if necessary on account of the length of the article to be turned or to secure the wood more firmly in the lathe.

It is to be understood that I do not limit myself to the use of the particular work holding devices, to wit the head and tail stocks herein shown and described as any usual or preferred form of work holding devices may be employed and I do not desire to be limited to the exact details of construction shown and described as variations may be made in the same without departing from the spirit of my invention.

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

1. In a lathe, the combination with the main cutter and work holding devices, of the steadying rest and the auxiliary cutter in a different plane from the main cutter and operating independently thereof for grooving the work for said rest in advance of the main cutter, substantially as described.

2. In a lathe the combination with work holding devices, of the steadying rest having portions for engaging the work on the side next to the cutter, the distance between the adjacent work engaging portions of said rest being less than the diameter of the portion of the work engaged by said rest, substantially as described.

3. In a lathe the combination with the main cutter and work holding devices, of a steadying rest, an auxiliary cutter for cutting a groove in the work to receive said rest, and means for clamping said rest upon the work in said groove, substantially as described.

4. In a lathe the combination with work holding devices, of a steadying rest comprising two opposing jaws for gripping the work between them the distance between opposite work engaging portions of said jaws, being less than the diameter of the portion of the work engaged by said jaws, substantially as described.

5. In a lathe the combination with work holding devices, of a steadying rest comprising two movable jaws for engaging opposite sides of the work, and clamping it against accidental removal from said work holding devices the portions of said jaws adjacent to the cutters being cut away to allow the portion of the work engaged by said jaws to project beyond them, substantially as described.

6. In a lathe the combination with work holding devices, of a steadying rest comprising a pair of movable jaws having angular recessed portions for engaging the work at four isolated points on opposite sides of the center of the work the distance between opposite work engaging portions of said jaws being less than the diameter of the portion of the work engaged by said jaws, substantially as described.

7. In a lathe the combination with the main cutter and work holding devices movable with respect to said cutter, of the steadying rest and an auxiliary cutter in a different plane from the main cutter and operating independently thereof for engaging the work in advance of the main cutter whereby said work holding devices will first bring the work to the auxiliary cutter to groove it for the reception of the steadying rest before it is brought to the main cutter, substantially as described.

8. In a lathe the combination with the main cutter and work holding devices, movable with respect to said cutter in a different plane from the main cutter and operating independently thereof, of the steadying rest, an auxiliary cutter for forming a groove for said rest, and means for automatically releasing said steadying rest, substantially as described.

9. In a lathe the combination with the main cutter, and work holding devices movable with respect to said cutter, of the steadying rest for grasping the work, an auxiliary cutter in a different plane from the main cutter and operating independently thereof for forming a groove to be engaged by said rest, means for clamping said rest upon the work including a wheel having a friction surface, and a friction strip for turning said wheel to release the steadying rest, substantially as described.

10. The combination with work holding devices, of a steadying rest provided with a cutter for forming a groove to receive said rest, substantially as described.

11. The combination with work holding devices, of a steadying rest comprising a pair of movable jaws, and a movable cutter for forming a groove to be engaged by said jaws, substantially as described.

12. The combination with work holding devices, of a steadying rest comprising a pair of movable work engaging jaws, one of said

jaws being provided with a cutter, substantially as described.

13. In a lathe the combination with work holding devices, of a steadying rest comprising a pair of movable work engaging jaws, a cutter secured to one of said jaws and adjustable stops for limiting the movement of said jaws and cutter toward the work, substantially as described.

14. In a lathe the combination with the cutter, of work holding devices movable with respact to said cutter, including a work holding chuck, operating means for rotating said chuck, clutching mechanism for connecting said chuck and operating means, and a device for automatically releasing said clutch to permit the work to be inserted without stopping said operating means, substantially as described.

15. In a lathe the combination with the cutter, of work holding devices movable with respect thereto, including a work holding chuck, operating means for rotating said chuck, a clutch mechanism for connecting said chuck and operating means and a device having a yielding portion for automatically disengaging said clutch to permit the insertion of the work without stopping said operating means, substantially as described.

16. A lathe comprising among its members, a steadying rest independent of the work supporting devices and an auxiliary cutter located in a different plane from and independent of the main cutter, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM T. WOOD.

Witnesses:
VOLNEY S. WOOD,
L. P. WHITAKER.