T. D. SMITH.

AUTOMATIC WOOD TURNING MACHINE.

APPLICATION FILED JAN. 27, 1909.

1,001,561. **Patented Aug. 22, 1911.**

7 SHEETS—SHEET 1.

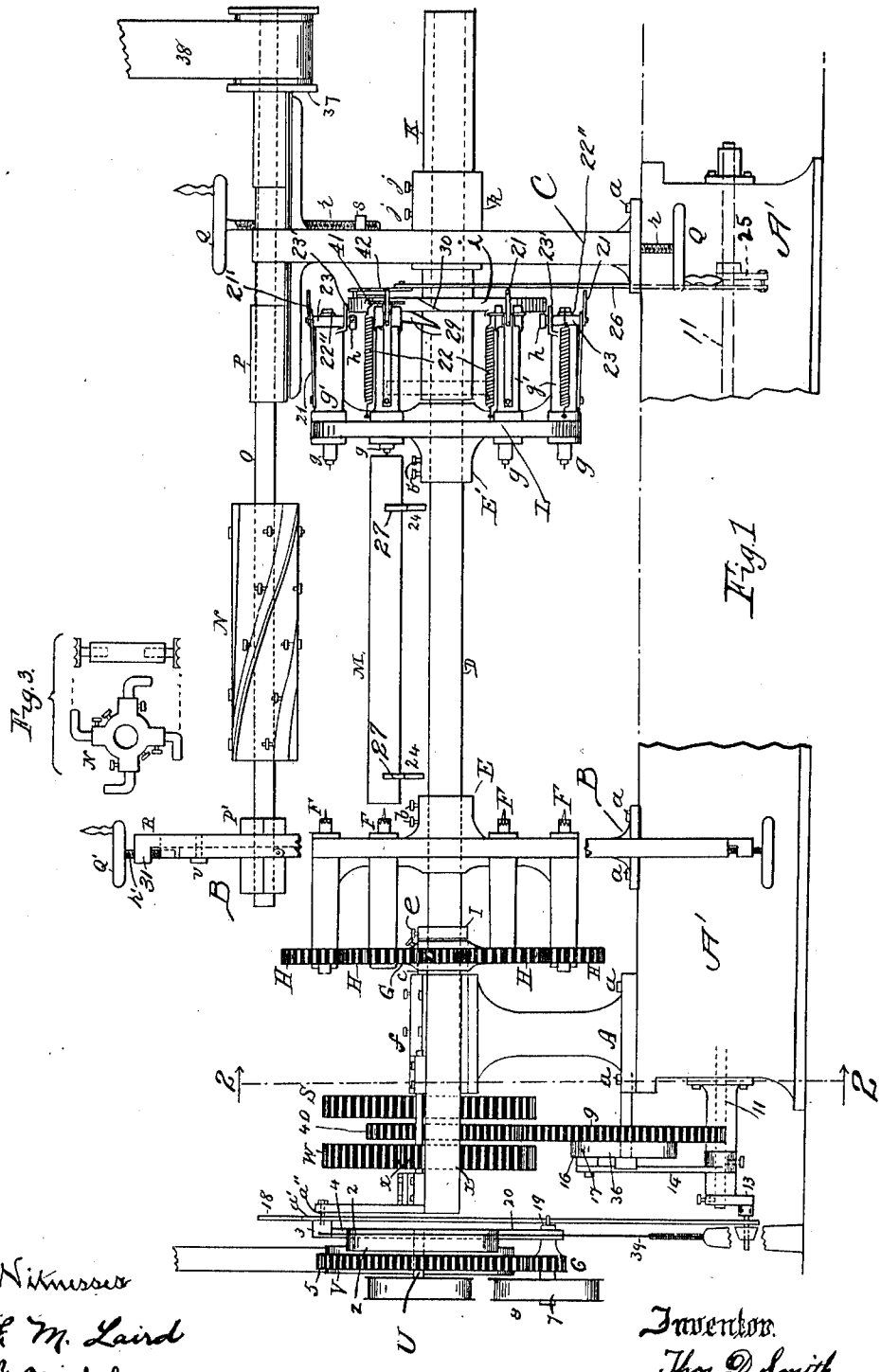

Fig. 1

Fig. 3

Witnesses
F. M. Laird
G. Nicholson

Inventor
Thos D. Smith
By Hm Bruce Atty

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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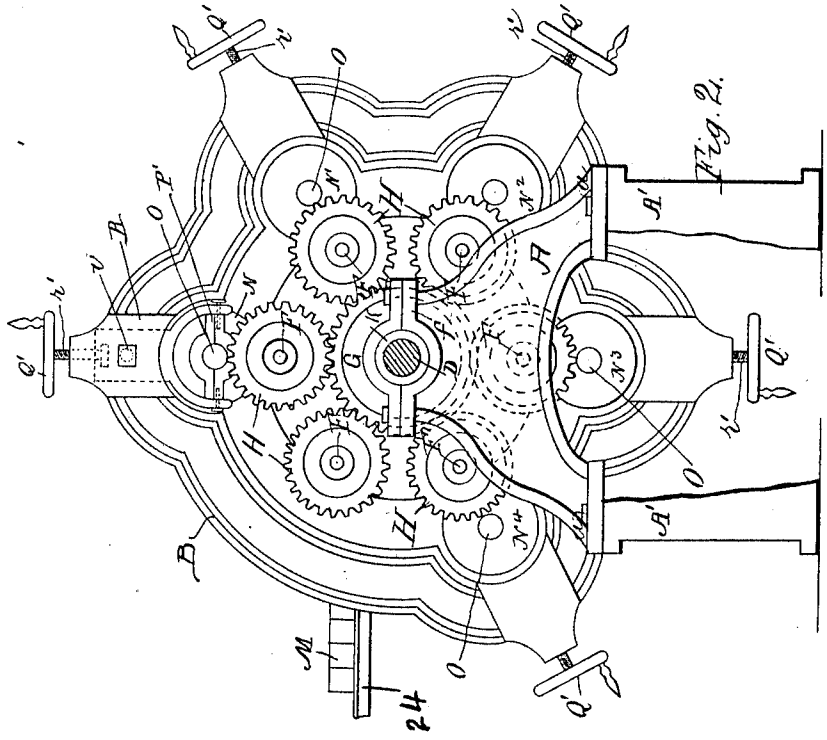

Fig. 2.

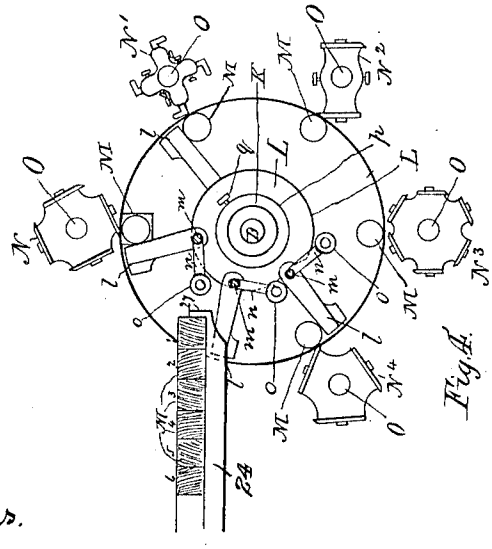

Fig. 4.

Witnesses.
G. Nicholson
F. M. Laird

Inventor
Thos D. Smith
By Wm Bruce
Atty.

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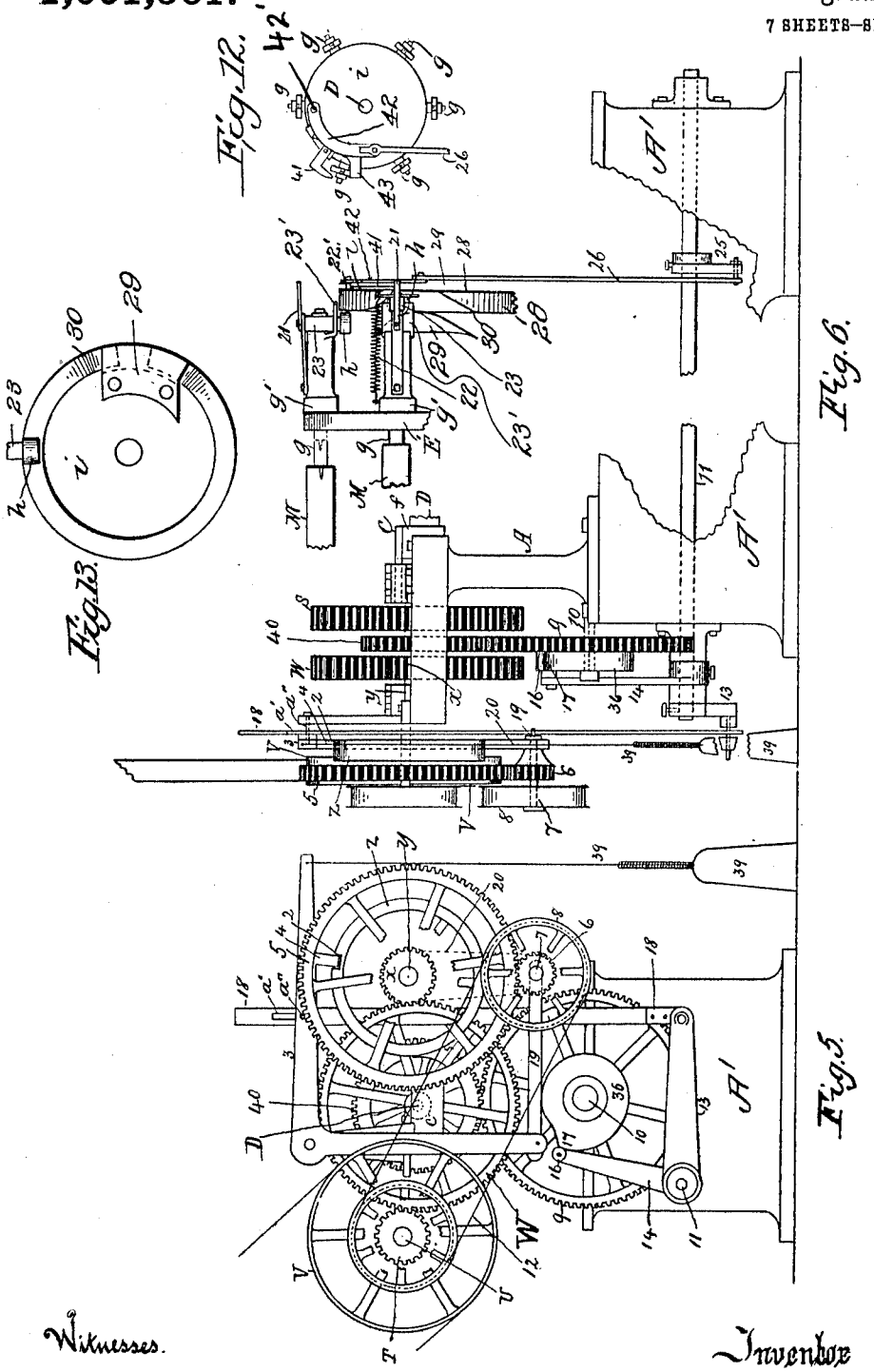

Fig. 12.

Fig. 13.

Fig. 6.

Fig. 5.

Witnesses.

G. Nicholson

F. M. Laird

Inventor

Thos D. Smith

By H. Bruce

Atty

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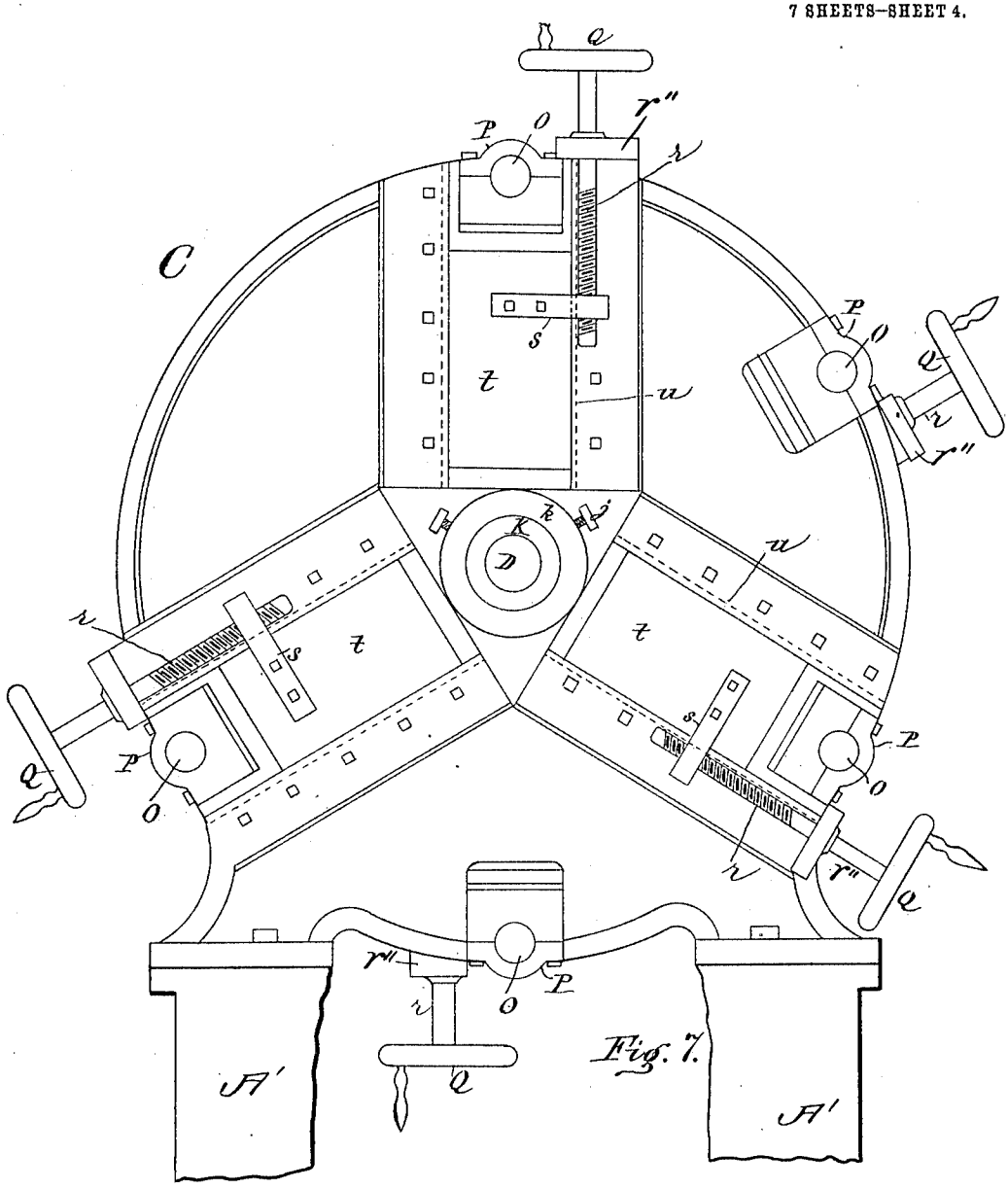

Fig. 7.

Witnesses
G. Nicholson
F. M. Laird

Inventor
Thos. D. Smith.
By Wm. Bruce.
Atty.

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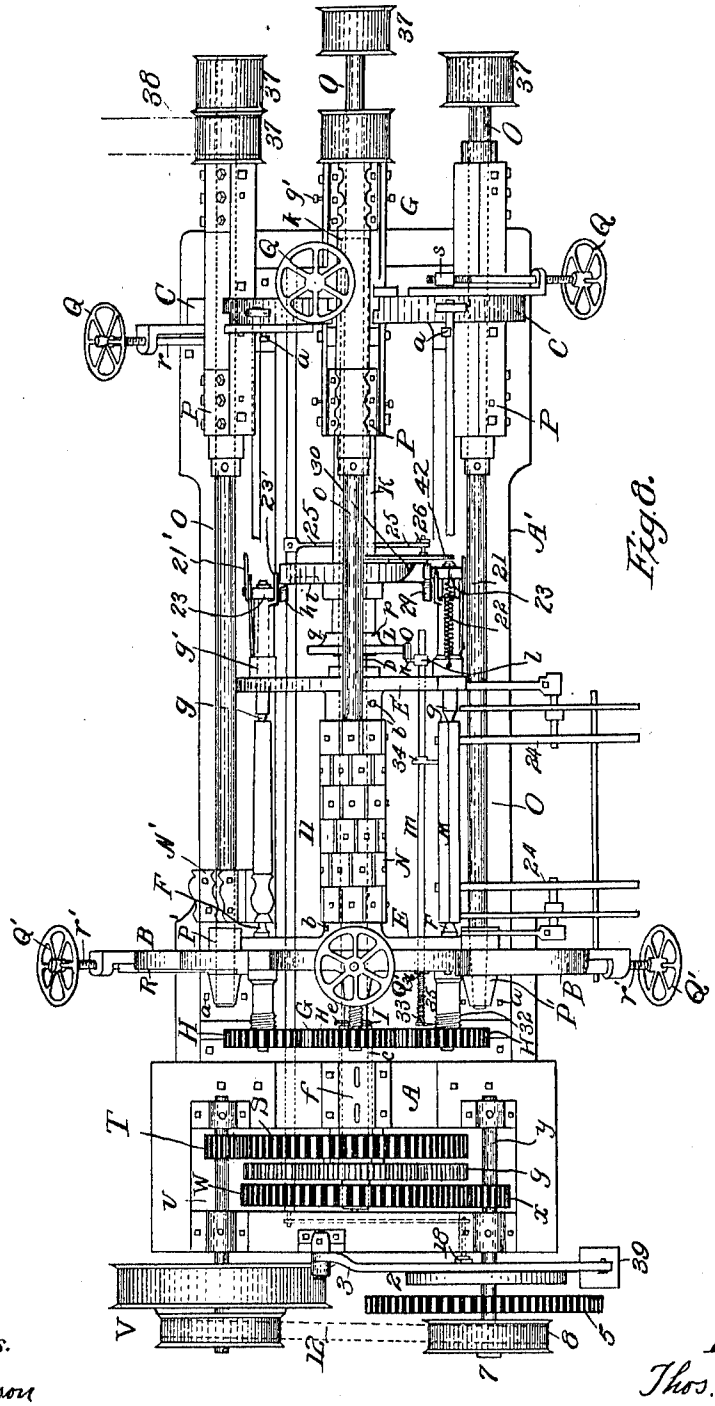

Fig. 8.

Witnesses.
S. Nicholson
F. M. Laird.

Inventor.
Thos. D. Smith
By Wm. Bruce.
Atty.

T. D. SMITH.

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7 SHEETS—SHEET 6.

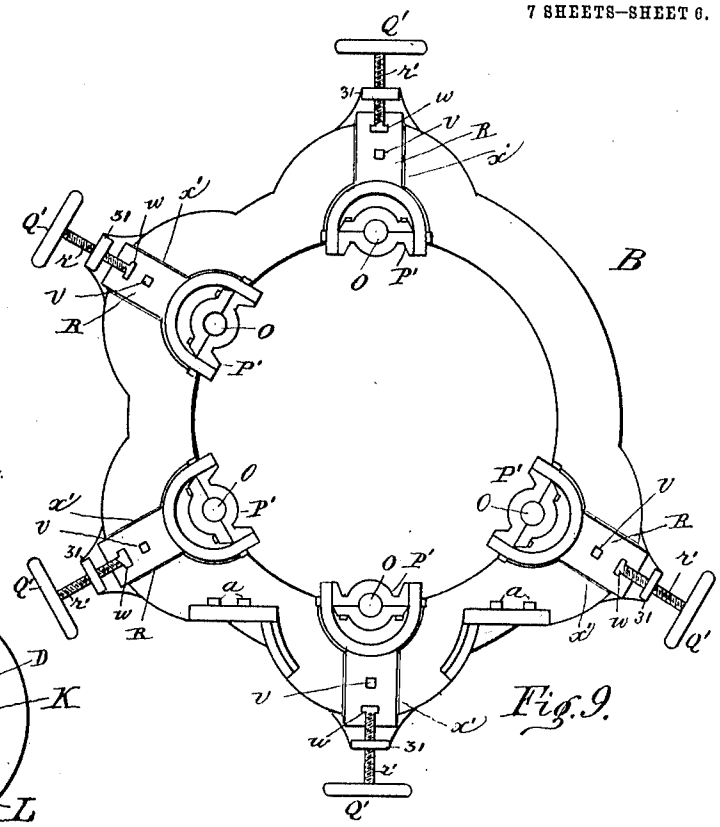

Fig. 9.

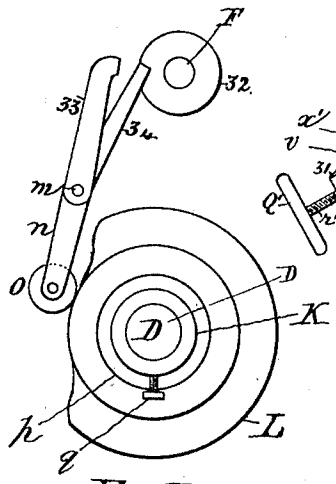

Fig. 11.

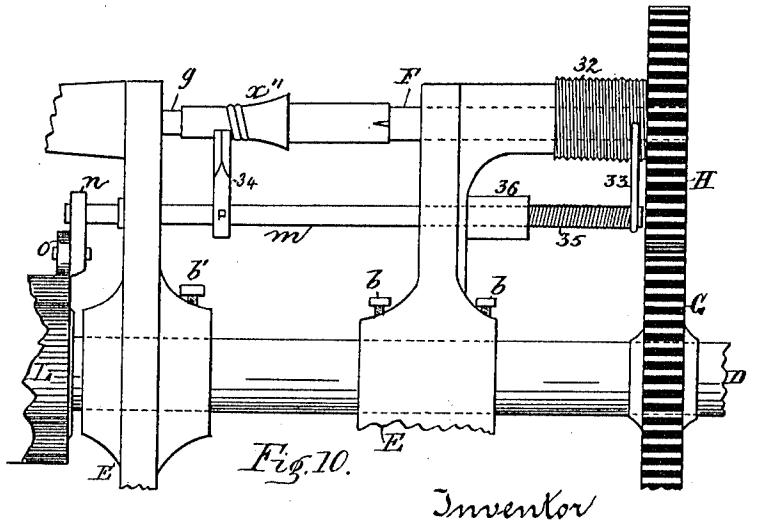

Fig. 10.

Witnesses
G. Nicholson
F. M. Laird

Inventor
Thos. D. Smith
By Wm Bruce
Atty.

T. D. SMITH.

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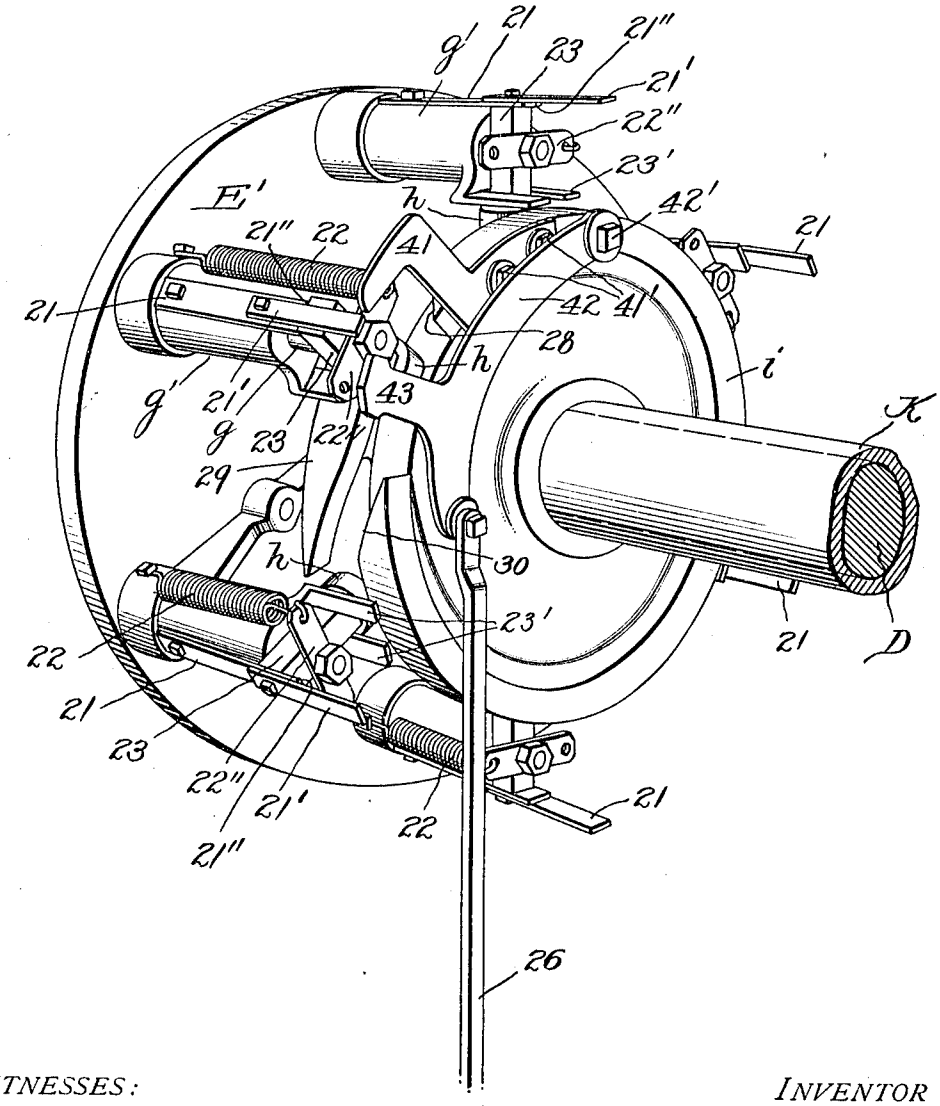
APPLICATION FILED JAN. 27, 1909.

1,001,561. **Patented Aug. 22, 1911.**

7 SHEETS—SHEET 7.

Fig. 14



WITNESSES:

Alice W. Holmes

Wm. H. Davidson

INVENTOR

Thomas D Smith

BY Wm. Bruce.

Attorney

UNITED STATES PATENT OFFICE.

THOMAS DARLING SMITH, OF HAMILTON, ONTARIO, CANADA.

AUTOMATIC WOOD-TURNING MACHINE.

1,001,561. Specification of Letters Patent. **Patented Aug. 22, 1911.**

Application filed January 27, 1909. Serial No. 474,623.

To all whom it may concern:

Be it known that I, THOMAS DARLING SMITH, a citizen of the Dominion of Canada, and resident of the city of Hamilton, in the county of Wentworth, in the Province of Ontario, Canada, have invented a certain new and useful Automatic Wood-Turning Machine; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same.

My invention relates to wood turning machines and has for its object to produce an improved automatic machine adapted for the rapid turning of such articles, as table and chair legs, chisel handles, casket bars, croquet balls, mallets, etc.

The invention consists in general in the construction hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a vertical cross sectional end view of the machine on the line 2—2 Fig. 1. Fig. 3 is an end view of the cutter head with a front view protracted. Fig. 4 is a side view of work-supporting bars and cutters detached from the machine. Fig. 5 is an end view of the machine in which is illustrated mechanism for governing the operation of the turret. Fig. 6 is a front view of mechanism for operating the tail spindles. Fig. 7 is a side elevation of one of the standards. Fig. 8 is a top plan view of the machine. Fig. 9 is a side view of one of the standards. Fig. 10 is an enlarged sectional view of screw-cutting mechanism. Fig. 11 is a partial end view of screw cutting device. Fig. 12 is a side view detached of cam wheel and tripping lever. Fig. 13 is an inner face view of the cam. Fig. 14 is an enlarged perspective view of cam and one of the turret heads to which the dead spindles are attached.

Referring more particularly to the drawings, A, B, and C (see Fig. 1) represent supporting standards which are bolted or otherwise secured to a suitable bed-frame A′ by fasteners *a*. The standards A and C support the main shaft D, upon which is disposed a double turret E, E′. The left hand portion E of the double turret is secured to the shaft D by set screws *b* and the right hand portion E′, is adjustable longitudinally on said shaft to accommodate different lengths of wood, the set screw *b*′ serving to secure said part to the shaft in any desired adjusted position.

The turret head E carries six spindles or centers F, each of which has, upon its outer end a small gear wheel H in mesh with a single enlarged gear wheel G, loosely disposed upon the main shaft D, but confined thereon against sliding movement between a collar I on one side and the bearing *f* on standard A on the other side thereof. A set screw *e* serves to secure the collar I to shaft D and against the end of a sleeve *c* loosely fitted on said shaft and upon one end of which the gear wheel G is mounted, the opposite end of the sleeve being extended loosely into the bearing *f*. The turret head E′ of the double turret is provided with dead spindles or centers *g*, longitudinally slidable in sleeves *g*′ rigidly connected to the head E′. It is of course understood that the spindles *g* are equal in number to and in longitudinal alinement with the spindles F.

Each of the dead spindles *g* has a head 23, the lower end of which passes through and is steadied by a bifurcated arm 23′ projecting from the sleeve *g*′, and the heads 23 which carry small rollers *h* have a laterally extending plate 22″ to which is secured one end of a coil spring 22, the other end of which is secured to the turret head E′. The rollers *h* engage a cam *i* which serves to draw the spindles *g* outwardly through the sleeve *g*′ against the tension of springs 22 and away from the spindles F at the proper time to release the work supported between said spindles. A spring plate 21 bolted to the sleeve *g*′ has a forwardly projecting finger 21′ secured thereto forming a shoulder 21″ adapted to engage behind the heads 23 to lock the latter temporarily in outermost position, until released by a lever 25 in a manner hereinafter described, whereupon the heads 23 and spindles *g* are pulled in the opposite direction, toward spindle F, by springs 22.

Leading between the turret-heads E E′ and into the path of movement of spindles F and *g*, are blank supporting ways 24 which support the blanks M as more clearly shown in Figs. 2 and 4. A stop 27 at the extremities of the supporting ways 24 is adapted to check the blanks M in position to be engaged between the spindles *g* and F as said

spindles are carried around into proper position by the turret-heads E E′ to be moved inwardly by the springs 22 before described.

The cam *i* before mentioned, is secured upon a sleeve K which sleeve is loosely mounted upon the shaft D but fixed against rotary movement by means of set screws *j j* passing through bearing hub *k* in standard C and engaging said sleeve. By this means the sleeve may be adjusted longitudinally of the shaft D, and the sleeve and consequently the cam *i* locked against rotation. As will be more clearly seen in Fig. 13, the cam *i* is in reality a disk having a part of its rim cut away to form spaced inclined surfaces or cams 28 and 30, facing inwardly toward the turret head E′. A plate 29′ having an outwardly facing cam surface 29 is bolted or otherwise secured to the inner face of the cam *i* in such position as to cause the rollers *h* to pass between the cam surfaces 29 and 30 and beyond the cam surface 29 before coming in contact with the cam surface 28.

As the rollers *h* (upon completion of a full revolution) reach the limit of their outward movement as they ride over cam surface 29, the spring finger 21′, as previously described, engages behind the head 23 of spindles *g* and holds the same in position to receive a new blank M. After the blank M has moved to proper position down the ways 24, a lever 42 pivoted at 42′ to the cam *i* is actuated through shaft 11 and connecting levers 25 and 26 to cause the integral projection 43 thereof to engage the spring finger 21′, leaving the spindle free to move inwardly to impinge the blank M with sufficient impact to cause the points of the spindles to engage and lift the blank off the ways 24. A continued rotary movement of the turret E′ causes the rollers *h* to engage and ride over the cam surface 28, which forces the dead spindle to tightly engage the blank before being brought into position to be acted upon by the cutters. A safety guard 41 is secured to the cam *i* by screws 41′ in position to engage the spring fingers 21 in the event that the levers 25 and 26 should for some reason fail to operate. It will thus be seen that at one time during the revolution of the turret head E′ the rollers *h* will engage and ride over the cam surface 29 and cause the dead spindles *g* to be forced outwardly to free the finished blank and into position to receive a new blank.

The blanks M are operated upon by a series of cutter heads N, N′, N², N³ and N⁴ (see Fig. 4) each of which is of a separate pattern and carries the necessary cutters. These blanks are mounted upon shafts O, which shafts have bearings P and P′ adjustably arranged in standards B and C around the turret-heads E and E′. Mounted on one end of the shafts O are driving pulleys 37 connected by belts 38, one pulley 37 and a part of one belt 38 being shown in Fig. 8 connected to a driving shaft suitably positioned but not shown. The cutters may be adjusted to and from the blanks M clamped between the spindles, by adjusting the bearings P and P′ in which the ends of shafts O are rotatably mounted.

The bearings P are a fixed part of brackets *t* which slide in grooves *u* (shown in dotted lines Fig. 7) formed in standards C. The brackets *t* and consequently the shafts O, and cutter heads N may be adjusted by screws *r*, passing through projections *n″* adjacent the bearings and through lugs *s* attached to brackets *t*. Hand wheels Q on the outer ends of the screws *r* are provided for manually adjusting the cutters. The bearings P′ in the standard B are mounted in the slidable hangers R (see Figs. 1, 2 and 9), the latter of which slide in recesses *x′* upon the outer surface of said standard, and are adjustable by means of screw rods *r′* working through projectors 31 in standard B and operated by hand wheels Q′. Thus by turning hand wheels Q and Q′ at their respective standards, shafts O and the cutters thereon may be adjusted toward or away, from the blanks to be cut, as deep or shallow cutting is desired. It will also be seen that the removal of set screw *v*, which holds journals P′ and hangers R in standard B, will allow sufficient room to remove and replace the cutters, without the necessity of taking the machine apart.

The driving mechanism comprises a double faced driving pulley V mounted upon a shaft U (see Figs. 5 and 6) the latter of which has mounted thereon a small gear wheel T in mesh with a large gear wheel S on the sleeve *c* previously described as loose upon the main shaft D. Upon a short shaft *y*, on the opposite side of main shaft D to shaft U, is mounted a large gear wheel 5 and a plain faced wheel 3 having a peripheral notch 2 which is adapted to receive a projection 4 depending from the horizontal arm of a bell-crank-lever 3. A weighted rod 39 attached to the free end of the horizontal arm serves to normally hold the latter down. The shaft *y* also carries a small gear wheel *x* in mesh with a large gear wheel W on the main shaft D, and pivoted to said shaft *y* is a lever 20 having at its lower end a pin 7 on which runs a small gear 6 in mesh with the aforementioned gear wheel 5. The lower end of the lever 20 is connected to one end of a lever 19 connected at its opposite end to the lower end of the vertical portion of the bell-crank-lever 3. On pin 7 and attached to its gear 6 is a pulley 8 connected to and

driven from one face of the driving pulley V by a belt 12. Upon a lower shaft 1 is mounted a gear wheel 9 and a cam 36 having an inclined surface 17, driven from the gear wheel 40 on loose sleeve *c* with which gear 9 meshes. A horizontal shaft 11 (before mentioned) extending the entire length of the machine is provided with oppositely extending fixed levers 13 and 14, the latter being provided at its extremity with a roller 16 in engagement with cam 36 to be moved by the said inclined surface 17 thereof. The movement of the lever 14 occurs at every revolution of the gear 9 and causes the shaft 11 to oscillate and correspondingly rock the levers 13 and the before mentioned levers 25 and 26.

A connecting rod 18 pivoted at its lower end to the extremity of lever 13, extends upwardly and is provided adjacent its upper end with a slot *a'* working over a pin *a''* projecting from the horizontal arm of belt-crank-lever 3.

It will thus be seen that when the lever 14 is forced back by the wheel or roller 16, coming in contact with the projection 17, the lever 13 will be caused to rise and by means of the connecting rod 18 will in turn rock the horizontal arm of the bell-crank-lever 3 to disengage the projection 4 from the notch 2 in wheel *z*. As the horizontal arm of the lever 3 is raised in a manner just described, the lower or vertical arm of said lever being connected to the oscillating lever 20 by means of the horizontal rod 19, the lever 20 is caused to swing with the gear 6 and pulley wheel 8 into position to tighten the belt 12 on wheel 8 and start rotation of gear wheel 5 and wheel *z*. As soon however, as the cam projection 17 passes roller 16, connecting rod 18 drops and belt-crank-lever 3 swings back slightly (but not sufficiently to loosen belt 12) until projection 4 reëngages the periphery of wheel *z* in position to enter notch 2, which movement (the dropping of projection 4 into catch 2) permits the lever 3 to swing back sufficiently to loosen belt 12 and check said wheel after each revolution and cause the same to halt temporarily with the shaft D and consequently the cutter heads. This action is repeated at each revolution of the wheel 9, it being understood that each revolution of said wheel 9, the turrets make one sixth of a revolution. It will also be seen that the sleeve *c* on shaft D is constantly rotated through pulley wheel V and gears *t* and S.

In order to steady lengthy blanks in position to be operated upon, I provide a series of supports, six in number, as shown by letters *n* and *l*, in Figs. 4 and 10, which are flexibly connected to horizontal shafts *m* passing through and extending between the turret heads E and E'. These shafts are oscillated by levers *n*, which carry rollers *o* traveling on the periphery of the cam L affixed upon a sleeve K previously described by means of set screw *q* on the hub *p* of said cam. The shafts *m* may constitute cutter rods to support cutters 34 for the purpose of cutting threads upon such blanks as used in making insulator pins, as shown in Figs. 10 and 11. To provide for this, a sleeve 32 is attached to a gear wheel 14, to be rotated thereby, and is provided with outside threads, with which the upper end of a chaser 33 attached to shaft *m* is adapted to engage to guide the shaft *m* and the cutter 34 secured thereto. The shaft *m* has a head 36 adjacent the chaser 33, and is provided with a spring 35 coiled thereabout between said head and chaser serving a double function in producing a rotary tension to cause roller *o* at the end of lever *n* previously described, to follow closely the contour of cam L, and to move the shaft *m* back to starting position when the thread has been cut and cam L oscillates the shaft to disengage chaser 33 from sleeve 32. While this operation is described and shown in connection with but one of the shafts *m*, it will be understood that each of these shafts as previously described, have like means to perform like operations.

The practical operation of the machine may be described as follows:—The blanks to be turned being placed on supports 24, and the driving belts on their respective pulleys on the cutter shaft, and the main shaft, the shaft 11 is caused to oscillate and force the projection 43 on cam *i* through connecting rod 26 and lever 25 to push up the spring finger 21'. By this movement the head 23 of the tail spindle *g* is released from engagement with the shoulder 21'', whereupon the spring 22 causes the spindle *g*, to be drawn toward one end of the blank to be turned, with sufficient pressure to force the wood to the left against the opposing centers or spindles F and tightly clamp said blank preparatory to its being lifted from the ways 24. Immediately after the blank has been clamped between the spindles F and *g*, the turret heads E and E' are caused to rotate by the mechanism shown in Fig. 5, to make one-sixth of a revolution bringing one of the rollers *h* into contact with the incline 29 on the cam wheel *i*, thus causing the dead spindle *g*, to be forced into the end of the blank, clamping it securely before the turret head makes one sixth of a revolution, and bringing the blank in contact with the plain rapidly revolving cutter head N, Fig. 4. The turret head stops, by reason of the belt 12 on pulley 8 being loosened as previously described, while the wood makes at least one full revolution which has the effect of rounding the wood preparatory to cutting any special design upon it with the next cutter N'. In the meantime the second

blank slides down the ways 24 until it engages the stop 27, when the operation is repeated, the second blank being rounded by the plain cutter N, while the first blank is carried from the cutter N, to the cutter N'. This operation is continued until the blanks have been acted upon by all the cutter heads.

When the first blank arrives at cutter head N^4, the required design is finished and the blank ready to be released, which is accomplished by means of roller *h*, (attached to the tail spindle carrying the first blank) coming in contact with the incline projection 29, on cam wheel *i*. As heretofore explained, the roller *h* traveling up the inclined surface 29, has the effect of withdrawing the dead spindle *g*, (carrying the first blank) thereby releasing the finished blank, whereupon the turret heads come to a stop in the position assumed at the start.

Having thus described my device and its advantages, what I claim as my invention, and desire to secure by Letters Patent, is,—

1. In a wood turning machine, the combination of a double headed turret, supporting standards, a main shaft mounted in said standards upon which said turret heads are mounted, a plurality of spindles mounted to rotate with said turrets, means for intermittently rotating said turrets comprising a large gear wheel mounted on the end of said main shaft, short shafts mounted on either side of said main shaft, a sleeve on said main shaft and a large gear wheel on said sleeve, one of said short shafts having a double faced driving pulley on one end and a small gear on the other end meshing with the large gear on said sleeve and the other short shaft having a large gear wheel, at one end and a small gear at the other end meshing with the large gear on said main shaft, a plain faced wheel on said last mentioned short shaft having a peripheral notch, a lever pivoted to the last mentioned short shaft carrying a driving pulley and a small gear wheel, a belt connecting said drive pulley with one face of the before mentioned double faced drive pulley, a double lever having a projection adapted to fit in the notch on said plain faced wheel, and means for operating said lever thereby simultaneously lifting said projection out of said notch and tightening the belt connecting said drive pulleys and bringing the small gear carried by said pivoted lever into engagement with the large gear on the end of said last mentioned short shaft, whereby said turrets will be partially rotated.

2. In a wood turning machine, the combination of a double headed turret, supporting standards, a main shaft mounted in said standards upon which said turret heads are mounted, a plurality of spindles mounted to rotate with said turrets, means for intermittently rotating said shaft and said turret heads, sleeves secured to one of said turrets through which the dead spindles are adapted to slide, said dead spindles having heads carrying rollers, a cam in the path of said rollers whereby when said rollers ride over said cam said dead spindles will be drawn outwardly, spring dogs on said sleeves adapted to engage the heads of said spindles and hold them in outward position, a rock shaft connected to the means for rotating said main shaft, and an upwardly projecting rod secured to said rock shaft adapted to engage said spring dog and free said head intermittently during the rotation of said main shaft, and a spring secured at one end to the head of the dead spindle and at the other end to said sleeve.

3. In a wood turning machine, the combination of a double headed turret, supporting standards, a main shaft mounted in said standards upon which said turret heads are mounted, a gear fixed to said main shaft, a plurality of spindles mounted to rotate with said turrets, means for intermittently rotating said main shaft, comprising a driving shaft carrying a double faced driving pulley and a gear, a short shaft carrying a notched plain faced wheel and a gear meshing with the gear on said main shaft, a lever connected to said short shaft carrying a gear and a pulley, a belt connecting said pulley with the pulley on said driving shaft, a bell-crank-lever having a projection adapted to fit in the notch on said plain faced wheel and then operating to loosen said belt and acting normally to hold said belt tight when bearing against the periphery of said plain faced wheel, and means for rocking said bell-crank-lever.

Signed at Hamilton, Ontario, this 4th day of November, 1908.

THOMAS DARLING SMITH.

In the presence of—

S. CLIVE,

WM. BRUCE.