H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 2, 1912.

1,076,734.

Patented Oct. 28, 1913.

7 SHEETS—SHEET 1.

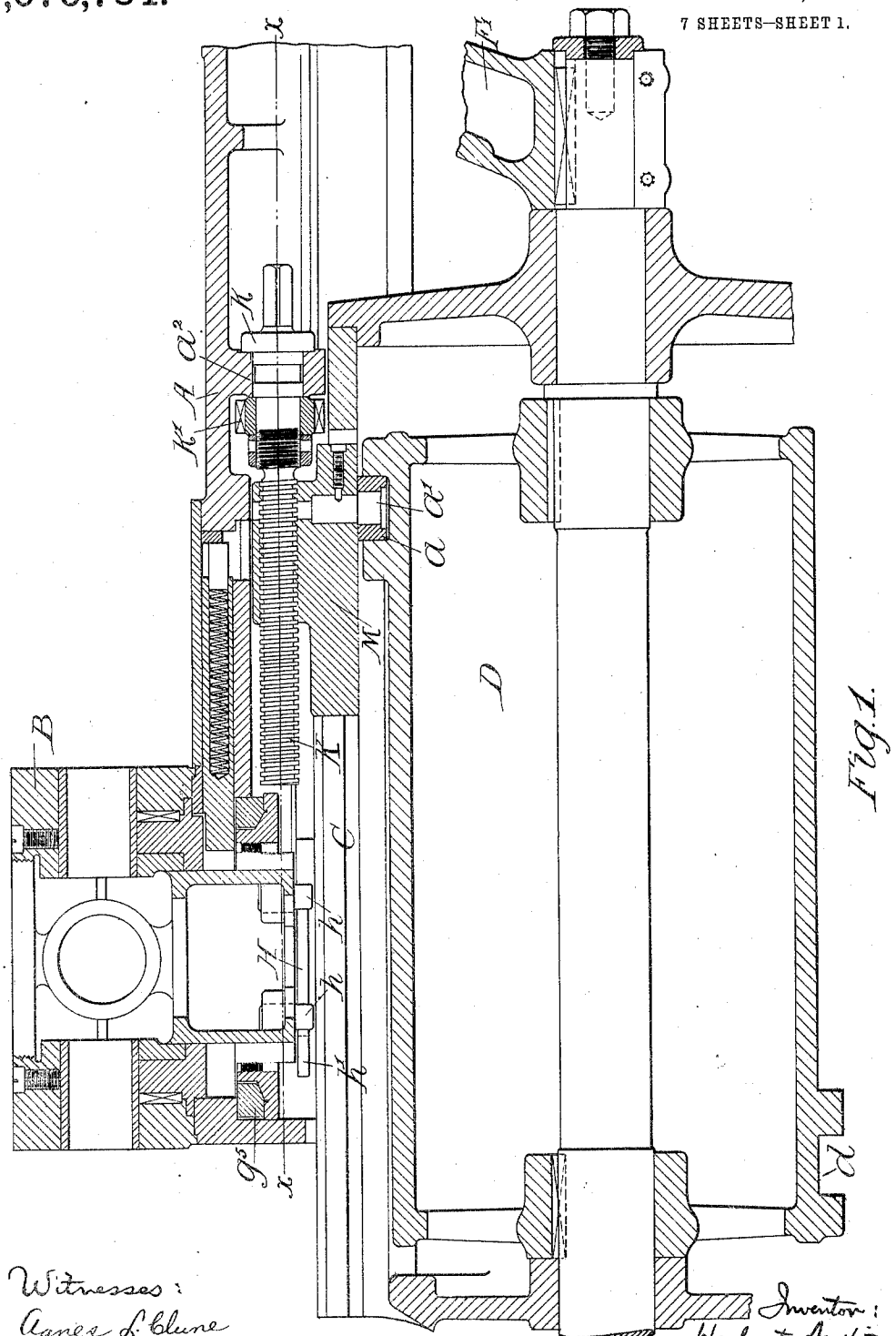


Fig. 1.

Witnesses:
Agnes L. Cleve
Anthony F. Greene.

Inventor:
Herbert Austin
By Edmund Cooper Brown
Attorney

H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 2, 1912.

1,076,734.

Patented Oct. 28, 1913.

7 SHEETS—SHEET 2.

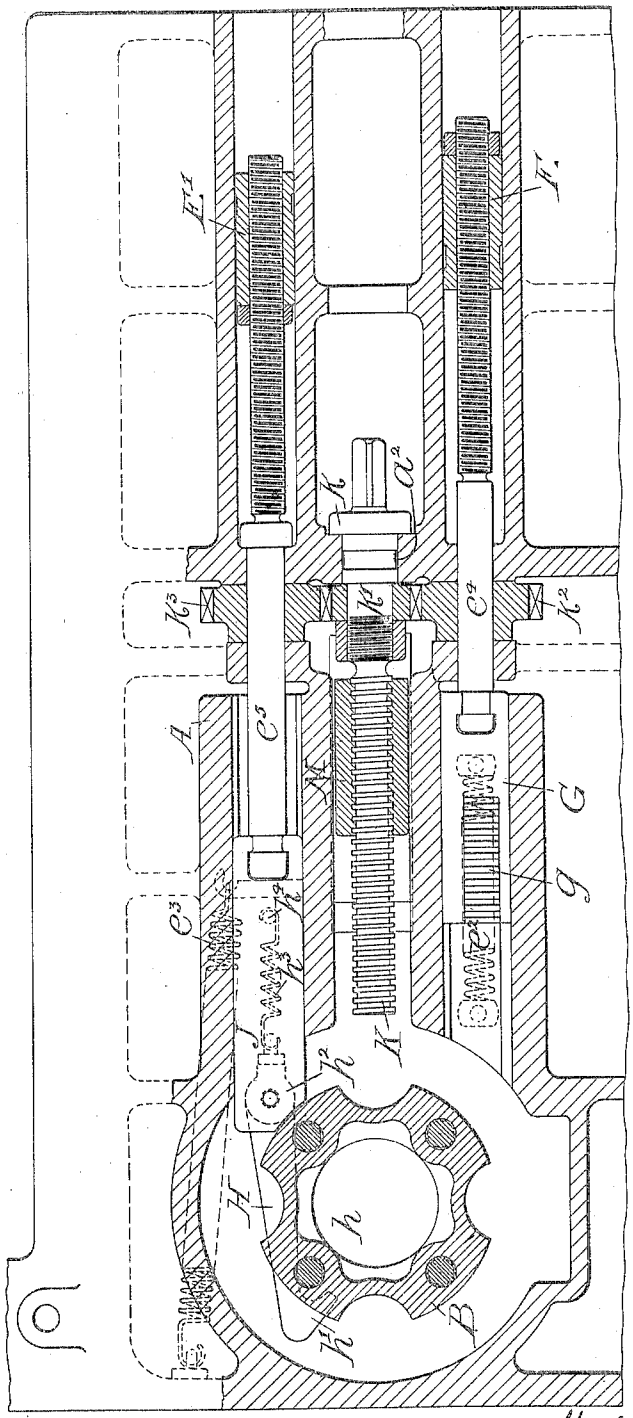


Fig. 2.

Witnesses:
Agnes L. Cline
Anthony H. Greene

Inventor
Herbert Austin
By Edmund Cooper Brown
Attorney

H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 3, 1913.

1,076,784.

Patented Oct. 28, 1913.

2 SHEETS-SHEET 2.

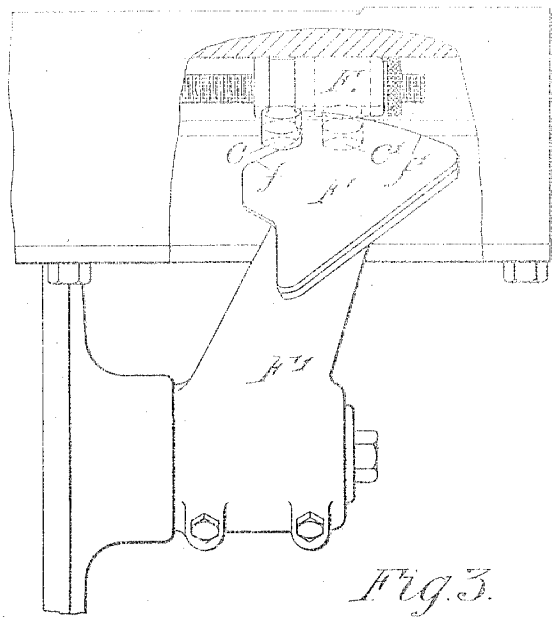


Fig. 3.

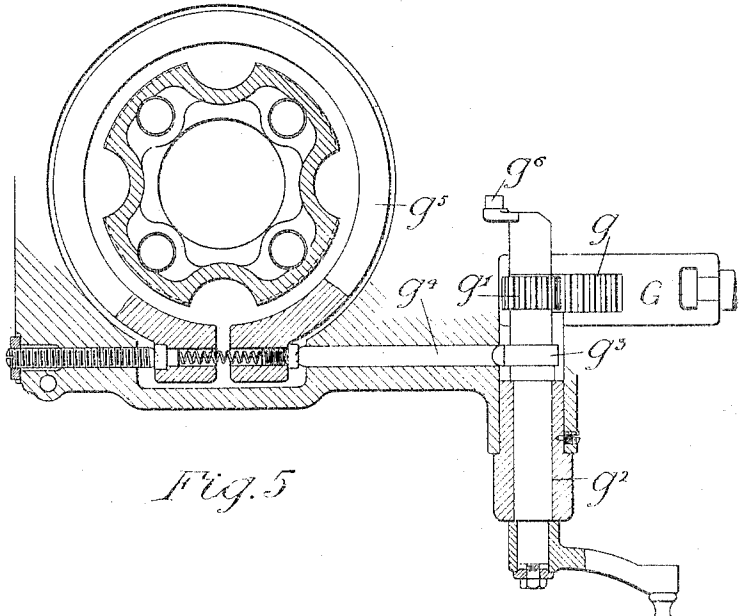


Fig. 5

Witnesses:
Agnes L. Cline
Anthony F. Lucas

Inventor:
Herbert Austin
By Edmund Congar Brown
Attorney

H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 2, 1912.

1,076,734.

Patented Oct. 28, 1913.

7 SHEETS—SHEET 4.

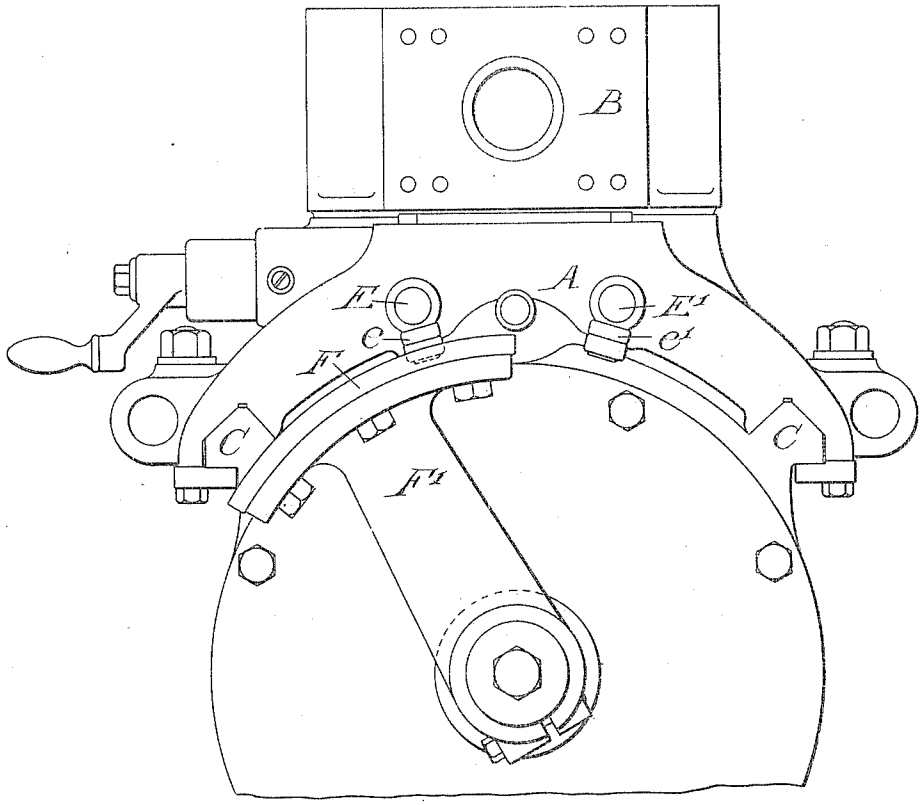


Fig. 4.

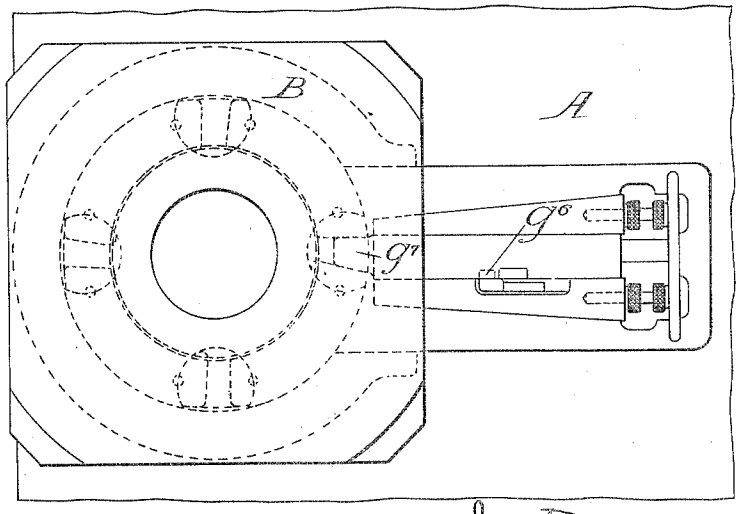


Fig. 6.

Witnesses:
Agnes L. Cleine
Fairbanks & Greene

Inventor:
Herbert Austin
By Edmund Ongar Brown
Attorney

H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 2, 1912.

1,076,734.

Patented Oct. 28, 1913.

7 SHEETS—SHEET 5.

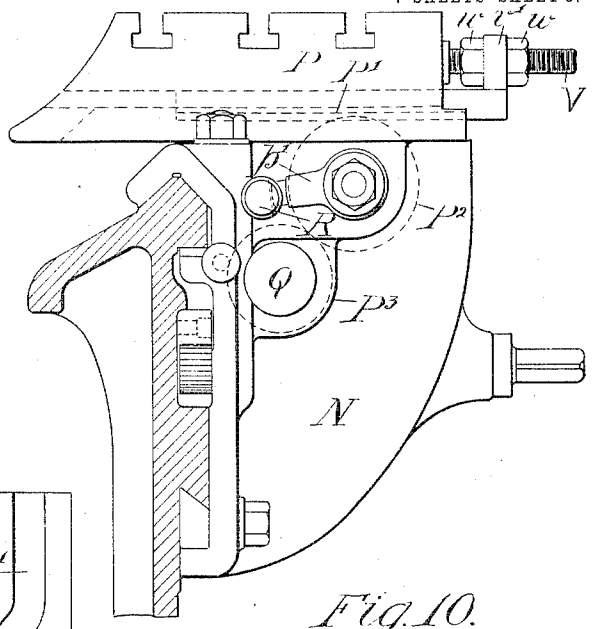


Fig. 10.

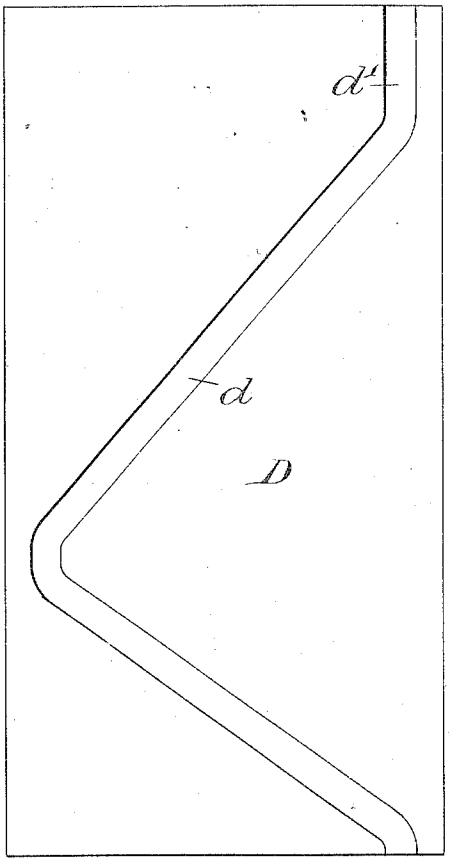


Fig. 7.

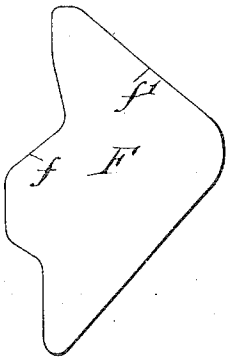


Fig. 8.

Witnesses:
Agnes L. Blume
Anthony J. Arcone

Inventor:
Herbert Austin
By Edmund Congar Brown
Attorney.

H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 2, 1913.

1,076,734. Patented Oct. 28, 1913.

7 SHEETS-SHEET 6.

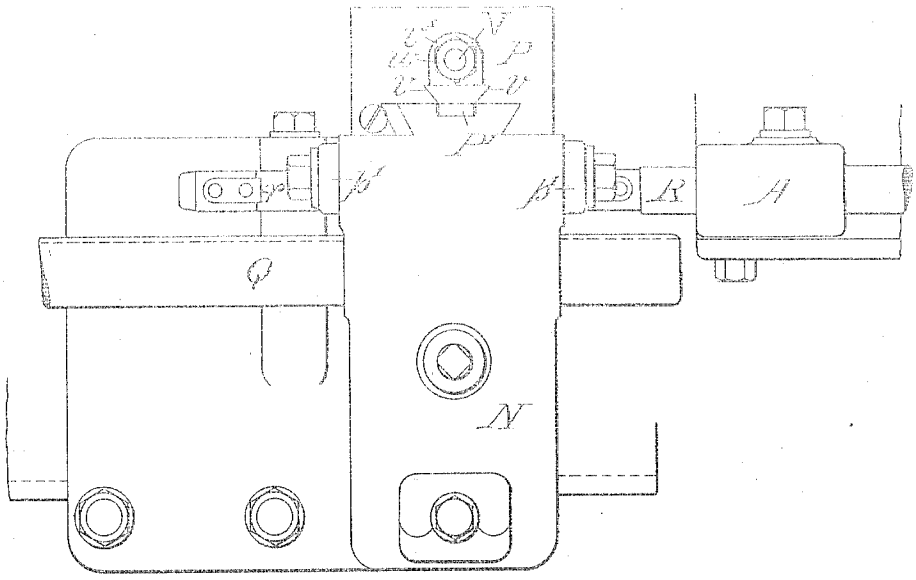


Fig. 9.

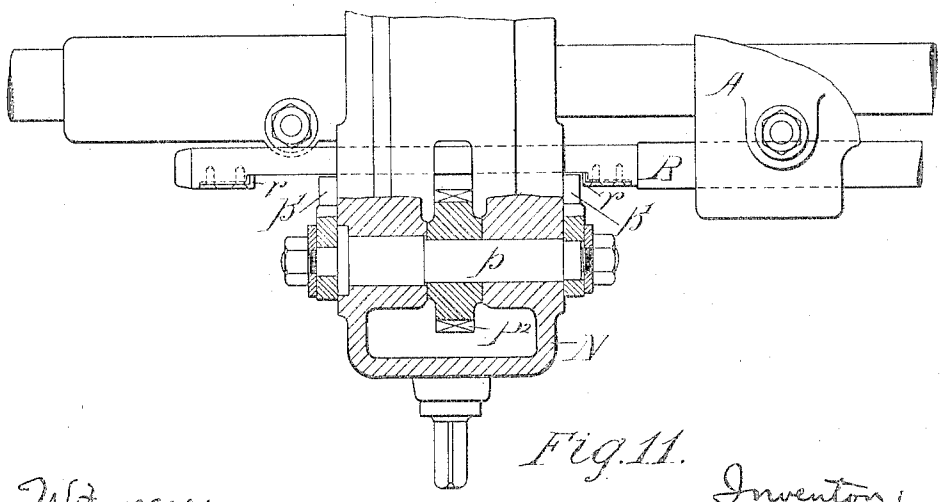


Fig. 11.

Witnesses:
Agnes L. Colburn
Anthony H. Greene

Inventor:
Herbert Austin
By Edmund Congar Brown
Attorney

H. AUSTIN.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

APPLICATION FILED FEB. 2, 1912.

1,076,734.

Patented Oct. 28, 1913.

7 SHEETS-SHEET 7.

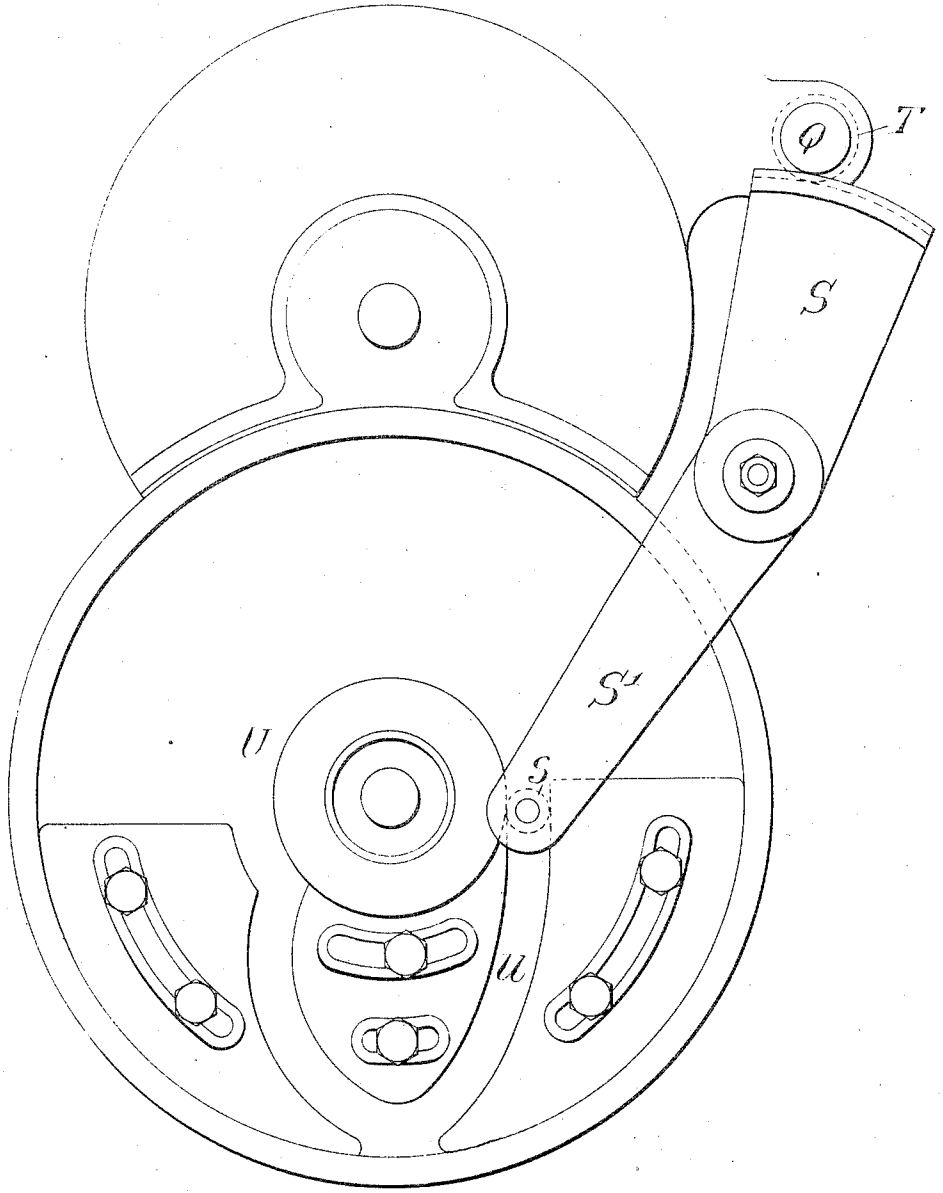


Fig. 12.

Witnesses:
Agnes L. Cleaves
Arthur H. Greene

Inventor:
Herbert Austin
By Edmund Conger Brown
Attorney

UNITED STATES PATENT OFFICE.

HERBERT AUSTIN, OF BROMSGROVE, ENGLAND.

MACHINE OF THE TURRET TYPE FOR TURNING AND LIKE OPERATIONS.

1,076,734. Specification of Letters Patent. Patented Oct. 28, 1913.

Application filed February 2, 1912. Serial No. 674,872.

To all whom it may concern:

Be it known that I, HERBERT AUSTIN, a subject of the King of Great Britain, and residing at Bromsgrove, in the county of Worcester, England, engineer, have invented certain new and useful Improvements in Machines of the Turret Type for Turning and like Operations, of which the following is a specification.

My invention relates to machines of the turret type for turning and like operations, and consists in the novel construction, arrangement and combination of various devices and parts, as hereinafter more particularly described.

In order that the invention, in respect of all its features, may be clearly understood, I will proceed to describe the same by reference to the drawings herewith, which show, by way of example, a convenient practical application thereof.

Of these drawings: Figure 1 shows a longitudinal section through the turret, turret saddle, cam for operating the turret saddle, and the inner end of the arm of a cam for operating the locking and turning devices for the turret. Fig. 2 is a sectional plan taken in the plane indicated by the line *x x* of Fig. 1. Fig. 3 is a side elevation of the cam for operating the locking and turning devices for the turret, showing also the hinder end of the saddle and the rollers of the locking and turning devices which are operated by the cam. Fig. 4 is a rear end view of the turret saddle and the cam for operating the locking and turning devices for the saddle. Fig. 5 is a sectional plan of a portion of a clamping device for use in locking the turret. Fig. 6 is a plan of mechanism for insuring that the turret will be located correctly as to the position to which it is turned before being clamped down. Fig. 7 is a view showing spread-out into a plane the surface of the cam which operates the turret saddle. Fig. 8 is a view, showing spread-out into a plane, the surface of a cam of which the opposite side edges operate, respectively, the locking and turning devices for the turret. Fig. 9 is an outer end view of a cross-slide and outer side view of the saddle by which it is carried, showing the means by which the saddle is operated by the turret saddle. Fig. 10 is a transverse section through one side of the lathe bed showing an end view of the saddle for the cross-slide with the cross-slide carried thereon. Fig. 11 is a plan view, partly in section, of the saddle which carries the cross-slide; and, Fig. 12 is a view showing mechanism by which the shaft is operated which operates the cross-slide.

I will first describe, by aid of the drawings, the improvements first above described, and in doing so will refer to Figs. 1 to 8 inclusive. A is the turret saddle, B the turret, C the bed along which the turret saddle slides, and D the revolving barrel with which is formed a cam groove *d* with which an anti-friction roller *a*, carried by a stud *a'* of the saddle, engages. The cam groove *d* extends for such distance only lengthwise as is sufficient to move back the saddle to clear any turret tool from the work, and a portion *d'* of the groove *d*, at the rear end of the barrel D, runs for such distance simply circumferentially around the barrel as to hold back the turret for the time required to unlock and turn the turret and lock it again. This formation of the cam groove *d* is clearly indicated by Fig. 7. Sliders E and E', for use in, respectively, unlocking and turning the turret, are carried in suitable guides of the saddle A and are each provided with an anti-friction roller *e e'*, respectively. A cam F which is carried on the end of an arm F', being conveniently formed separately therefrom and fixed thereto by bolts, is formed with one of its edges *f* to operate against the roller *e* to move the slider E in a direction to unlock the turret, and with another edge *f'* to operate against the roller *e'* and move the slider E' in a direction to turn the turret, the slider E being moved against the force of a spring e^2 by which it is returned, and the slider E' being moved against the force of a spring e^3 by which it is also returned. The mechanisms by which the locking and the turning of the turret may be effected, may be of any known or convenient character which can be operated such as from the sliders E and E'. According to a convenient method which is shown for locking and unlocking the turret, a slider G, which is suitably guided in the saddle, as shown, is formed with rack-teeth *g* which gear with a pinion *g'* (see Fig. 5) on a spindle g^2 which carries a cam g^3, and this cam operates a rod g^4 in a direction to tighten a locking-ring g^5, around the turret in a manner to clamp it down; and on the inner end of the spindle g^2 is a crank having a crank-pin g^6 which, when the un-

locking is being effected moves, against the force of a spring, a locking-pin g^7 (see Fig. 6) out of one or other of a number of recesses which are spaced equally apart around the turret, this pin and these recesses being so shaped, as shown, that as the pin enters a recess it will insure that the turret will be brought into the exact angular position required before it is clamped down by the ring g^5. According to a convenient method which is shown, for turning the turret when unlocked, a hook-ended link H adapted to engage its hooked end in succession with a number of studs h of the turret, is pivoted at its inner end to a slider J which is operated by the slider E′ and is suitably guided within the saddle, as shown. The forward end of the link H has an inclined surface h' to adapt it to ride over a stud h during its outward movement, and to allow the link to yield outward in doing so, and then to return into the position which enables it to engage with the stud as the link is drawn back again, the link is formed with a backward extension h^2, the end of which is connected by means of a spring h^3 with a pin h^4 which is carried by and is near to the back end of the slider J, whereby the link is returned to its operative position immediately its hooked end has ridden over a stud.

I will now describe, by the aid of the drawings, the improvement secondly above described, and in doing so, will refer to Figs. 1 and 2 of the drawings herewith. A screw K is carried at its hinder end in a bearing a^2 of the turret saddle in such manner that it cannot move endwise in relation to the saddle. The endway movement is prevented, as shown, by a collar k of the screw which is immediately behind the bearing a^2, and a pinion k' of the pin which is immediately at the front of such bearing. The screw K is screwed through a slider M which is suitably guided along the bed C, and this slider consequently travels with the saddle. The roller a which engages with the groove d of the barrel D is carried by the slider M. The pinion k' gears at opposite sides with pinions k^2 k^3 which, respectively, surround sliding shafts e^4, e^5 of the locking and turning devices, respectively, and these shafts are slidable through their respective pinions, each pinion carrying a key which is a sliding fit within a long key groove of the corresponding shaft. The pinions k^2, k^3, are situated between fixed abutments of the saddle, as shown, which insures that they will always remain in the same positions in relation to the saddle, notwithstanding that the shafts e^4, e^5, are slidable endwise in relation thereto. The outer ends of the shafts e^4, e^5, are screwed through the sliders E E′, respectively, and the inner ends of the shafts are swivelled, as shown, to the sliders G and J, respectively, so that such shafts are capable of being turned in relation thereto. By turning the screw-pin K, the endway position of the turret saddle in relation to the slider M, may be varied as required, and may be consequently varied in relation to the position of the roller a which engages with the cam groove d. As the pin K is turned, the pinions k^2, k^3, are also turned and thus the shafts e^4, e^5, are screwed along within the sliders E, E′, respectively, moving such sliders correspondingly within their guides. The screw-threads of the shafts e^4, e^5, are the opposite hand to the screw-thread of the pin K, and thus to whatever extent the saddle is moved in one direction endwise in relation to the roller a, the sliders E, E′, are moved the same distance in the opposite direction, thereby maintaining their relation to the cam F by which they are themselves operated.

Describing now the improvement thirdly above described, I will refer to Figs. 9 to 12, inclusive. N is a hollow saddle, upon which is slidably mounted a cross-slide P for operating a tool at one side of the work. The cross-slide P is provided with a rack P′ at its underside, with which gears a pinion P^2 carried upon a short spindle p which is journaled in opposite sides of the saddle, and the pinion P^2 is driven by a pinion P^3 carried upon a shaft Q which passes slidably through bearings in opposite sides of the saddle and is rotatable therein, the pinion P^3 being provided with a feather key which is a sliding fit within a long key-groove of the shaft Q. This shaft Q is driven by any well known or convenient mechanism, such as that hereinafter described. The saddle is moved, either in one or both directions, endwise of the bed, as may be required, by movements of the turret saddle A a small portion of which only is shown. A longitudinal bar R is adjustably fixed at one end to the turret saddle, and, if it is required that the saddle N shall be moved in both directions by the turret saddle, the bar R passes right through and beyond the saddle N, as shown. The bar R is formed with two shoulders r, and on the ends of the spindle p which project from the opposite sides of the saddle N are fixed, respectively, arms p'. As the spindle p is turned in a direction to move in the cross-slide P, one of the arms p' is turned down into the path of one of the shoulders r, and then, as the saddle A moves toward the saddle N one of the shoulders r comes against this arm p' and moves the saddle N, during any further movement of the saddle A, in the same direction, and as the cross-slide is moved outward again the other arm is moved up into the path of the other shoulder and then as the turret saddle A moves back it brings the other shoulder r against

the other arm p' and thus draws back the saddle N. When the arms are clear of the shoulders any movements of the turret saddle will have no effect upon the saddle N. If it is simply intended that the turret saddle shall push the saddle N, and that such latter saddle shall be returned by hand, a single arm only is required upon the spindle p, and the end of the bar R may come up against this arm to push the saddle N, the bar entering a hole therefor in the saddle N when the arm is back and, in such case, imparting no movement to the saddle N.

According to convenient means of operating the shaft Q in opposite directions of rotation, which are shown by Fig. 12, a toothed quadrant S gears with a pinion T on one end of the shaft, and this quadrant is formed with a downwardly extending lever S′ on the end of which is an anti-friction roller s carried by a stud. This roller engages with a cam groove u of a cam U, during a portion of the revolution of the cam, and is operated thereby in the manner required, and during the remaining portion of the revolution of the cam, the roller is out of the groove and remains at rest. The cam itself is formed as a toothed disk, and is driven by a pinion from the main spindle of the machine, or in any convenient manner. The groove u is provided by means of adjustable cam plates which are fixed against the face of the disk in the manner indicated. If a cross slide is to be operated at the opposite side of the machine also, a second quadrant such as S and arm S′ would be used, an anti-friction roller on the end of the arm engaging with a cam at the back face thereof, similarly as the arm S′ is shown to engage at the front face thereof.

It now remains to describe, by the aid of the drawings, the improvement fourthly above described, in doing which I will refer to Figs. 9 and 10 of the drawings. The toothed rack P′ of the cross slide P is slidably fitted within the slide, such as within V-grooves v thereof. The rear end of the rack is formed with a lug v' which stands up therefrom, and a stud V is screwed tightly into the rear end of the slide P and passes through the lug v'. The slide may be moved endwise into any position required in relation to the rack, and then securely held in such position by means of nuts w w which are screwed upon the stud at opposite faces of the lug.

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

1. In a machine of the turret type for turning and like operations, a turret carrying saddle, a cam engaged therewith and operating the saddle endwise, part of said engagement being inoperative when the saddle is in its backward position, locking and turning means for the turret, and a cam having a face which, while the saddle remains stationary in its backward position, operates the locking mechanism to unlock the turret, and a face which, while the saddle remains stationary in its backward position, operates the turning mechanism and turns the turret.

2. In a machine of the turret type for turning and like operations, a turret carrying saddle, a cam engaged therewith and operating the saddle endwise, part of said engagement being inoperative when the saddle is in its backward position, locking and turning means for the saddle, a spindle which is carried by the saddle, and is screwed through a slidable portion of the saddle which engages with the cam whereby the position of the saddle in relation to the cam may be adjusted, screwed spindles of the locking and turning mechanisms, respectively, by which the effective length of such mechanisms may be adjusted, and said spindles gearing with the spindle for adjusting the saddle whereby, as the position of the saddle is adjusted in relation to the cam, the turret locking and turning mechanisms are adjusted in relation to the saddle.

3. In a machine of the turret type for turning and like operations, a turret saddle, a saddle carrying a cross-slide, a sideway opening in the saddle of the cross-slide, a bar carried by the turret saddle and capable of moving within the opening of the cross-slide saddle as the turret saddle moves, a movable stop-piece which, as the cross-slide is moved in one direction transversely of the machine, comes across a portion of the bar and insures that the movement of the turret saddle will move the saddle of the cross-slide.

4. In a machine of the turret type for turning and like operations, a turret saddle, a saddle carrying a cross-slide, a sideway opening in the saddle of the cross-slide, a bar which passes through the opening of the cross-slide saddle, shoulders of said bar, and movable stop-pieces one of which, as the cross-slide is moved in, comes into the paths of one of the shoulders and the other of which as the cross-slide is moved out comes into the path of the other of the shoulders, whereby it is insured that the turret saddle will move the cross-slide saddle in both directions.

5. In a machine of the turret type for turning and like operations, a turret saddle, a saddle carrying a cross-slide, a sideway opening in the saddle of the cross-slide, a bar carried by the turret saddle and capable of moving within the opening of the cross-slide saddle as the turret saddle moves, a spindle mounted in the cross-slide saddle, means for turning such spindle in opposite directions, a movable stop-piece carried by

the spindle and operated thereby to bring the stop-piece across a portion of said bar as the cross-slide is moved in one direction transversely of the machine, and a pinion of such spindle which gears with a rack of the cross-slide to move the slide toward and from the axis of the machine.

6. In a machine of the turret type for turning and like operations, in which the turret turns about a vertical axis, a turret carrying saddle, a cam engaged therewith and operating the saddle endwise, part of said engagement being inoperative when the saddle is in its backward position, rods mounted in the turret saddle and slidable longitudinally thereof, locking and turning means for the turret which are operated by the said rods respectively, a cam having a face which while the turret saddle remains stationary in its backward position operates one of the said rods and thereby unlocks the turret, and a cam having a face which while the saddle remains stationary in its backward position operates the other of the said rods and thereby turns the turret.

In witness whereof I have hereunto signed my name this 12th day of January 1912 in the presence of two subscribing witnesses.

HERBERT AUSTIN.

Witnesses:

ERNEST HARPER,

ROBERT G. GROVES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."