No. 801,253. PATENTED OCT. 10, 1905.

R. K. LE BLOND & W. F. GROENE.

TURRET LATHE.

APPLICATION FILED JUNE 15, 1904.

2 SHEETS—SHEET 1.

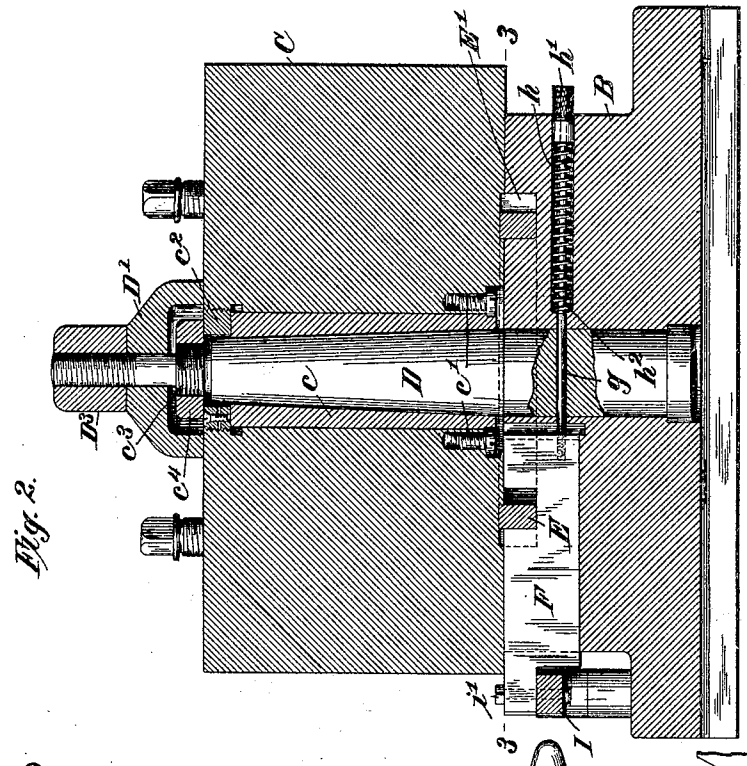

Fig. 2.

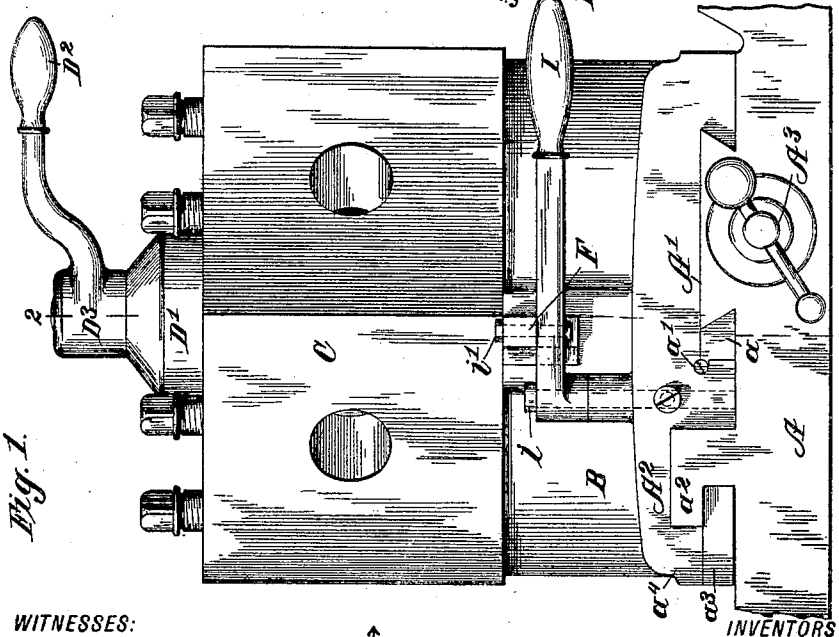

Fig. 1.

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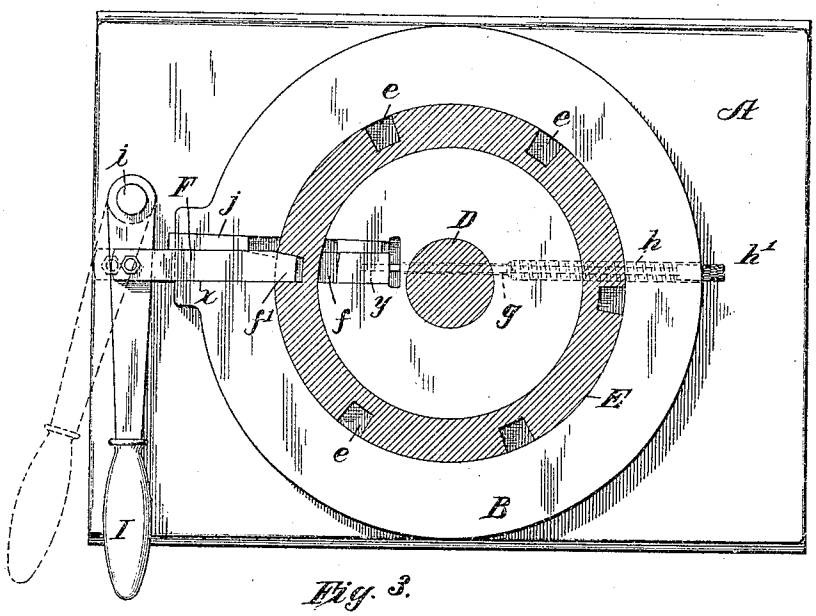

Fig. 3.

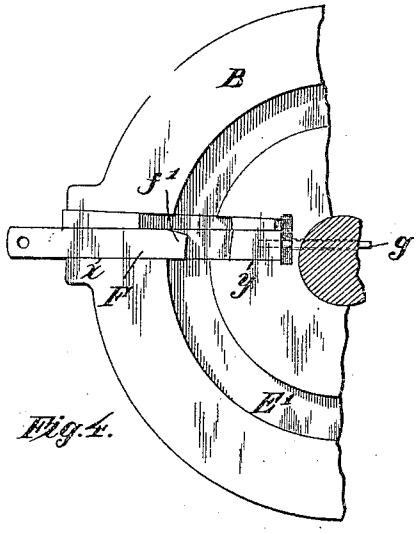

Fig. 4.

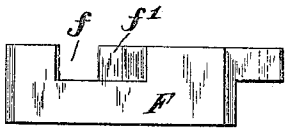

Fig. 5.

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UNITED STATES PATENT OFFICE.

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TURRET-LATHE.

No. 801,253. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed June 15, 1904. Serial No. 212,662.

To all whom it may concern:

Be it known that we, RICHARD K. LE BLOND and WILLIAM F. GROENE, citizens of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Turret-Lathes, of which the following is a specification.

The invention to be hereinafter described relates to metal-working lathes, and more particularly to that class of lathes wherein a rotatable turret is mounted on a carriage which is itself movable longitudinally of the machine bed or frame. In such form of lathes it is desirable that the turret be movable transversely of the carriage upon which it is mounted to properly position the turret with respect to the work and when so positioned that it be held rigidly and without liability of any backward tip or deflection due to strain against it during operation and that it be further locked against rotative movement. In the operation of devices of this character there is always present a strain or force acting at a point considerably above the carriage and tending to tilt or deflect the upper end of the turret and under some conditions to turn the turret upon its vertical axis. Such objectionable movement would take place if there is any play between the turret and the spindle upon which it is rotatably mounted. Should either of these movements take place even to a small degree, imperfection of the work or injury to the tool is liable. The importance, therefore, of providing means which will effectually obviate such objectionable deflection or tilt of the turret becomes obvious; and with this in view the objects of the present invention are to provide such stable and rigid connections between the turret and its carrying instrumentalities that while they will permit ready adjustability of the turret transversely and rotatively with respect to such instrumentalities they will effectually distribute the tilting or deflecting strains in such manner as to entirely obviate the objections pointed out.

With the above objects in view the invention, generally stated, consists of means for so connecting the turret to the carriage that the deflecting strains shall be distributed over a wide base having a plural number of independent and separate connections with the carriage transversely thereof, so that a plural number of resisting leverages against such strains will be furnished at the most advantageous points and in the most effective directions to counteract the deflecting or tilting strains, while yet permitting transverse adjustment of the turret on the carriage, and to provide an effective lock and rotative mounting for the turret that will prevent any lost motion between the parts.

The invention also consists of the parts and combination to be hereinafter more fully described, and definitely pointed out in the claims.

In the drawings, Figure 1 represents a side elevation of sufficient of the carriage and the turret connection therewith to illustrate one form of the present invention. Fig. 2 is a section of Fig. 1 on the line 2 2. Fig. 3 is a horizontal section taken on the line 3 3 of Fig. 2. Fig. 4 is a detailed plan view of a part of the bottom slide with the turret-block removed, showing the locking-plunger and its mounting. Fig. 5 is a detail side elevation of the locking-plunger.

Referring to the drawings, A represents any desirable form of carriage mounted, as usual, upon the bed or machine frame for longitudinal adjustment or movement, and being well understood by those skilled in the art further description or illustration is unnecessary.

Mounted upon the carriage A and transversely movable thereof is the turret, comprising the bottom slide B, the turret-block C, and its adjunctive parts, the front of the turret or its side toward the work being to the left in Fig. 1. As well understood, the turret when in use is subjected to strains substantially in the direction of the arrow *z*, Fig. 1, due to the pressure of the tool against the work. There is consequently present a tendency to tilt or deflect the turret backward due to such strains which must be resisted by the transverse mountings of the turret on the carriage, and unless effectually overcome this tilting or deflection of the turret becomes a serious defect in this class of lathes. As more clearly shown in Fig. 1, the bottom slide B is connected to the carriage A at a plurality of widely separated points, that toward the front or work side of the turret being a right angle-bearing, so that the tilting or deflecting strains are directly resisted by the right-angle bearing and distributed over a broad base at independent points where the resisting leverage is such as to effectually overcome any tilting of the turret.

In the present embodiment of the invention

the bottom slide B is connected to the carriage by the transverse dovetail bearing A′, and disposed in front of said dovetail bearing A′—that is, to the side thereof toward the operating tool or work—by the right-angle gib-bearing, designated as a whole by reference-letter A^2. Thus the right-angle gib-bearing A^2, being located substantially beneath the working-tool to one side of the dovetail bearing A′ and acting in direct opposition to the strains, effectually prevents any upward lift of the turret at a point most effectual in overcoming any backward tilt or deflection of the upper part of the turret, and a plurality of transverse bearings are provided which coöperate in distributing the tilting or deflecting strains over a wide base, as will be readily understood.

The dovetail bearing A′ is adjusted to an accurate fit by means of a taper-gib a, suitably held to position by any usual means, as the screw a', so that bodily movement of the turret backward from the work under the strain of the working-tool is overcome.

The right-angle gib-bearing A^2 preferably comprises an inverted-L-shaped projection a^2, formed on the carriage A and extending transversely thereof, a gib a^3 being suitably secured to the projecting lip a^4 of the bottom slide B and extending beneath the overhang of the projection a^2. The gib a^3 extends transversely of the bottom slide, and thus affords a broad and extended bearing against the under side of the projection a^2, giving the most advantageous resistance against any upward lifting movement at that side of the turret and securing the well-known advantages of a square gib.

It will be noted in the present form of the invention that the dovetail bearing A′ is mainly located back of or to the rear of the vertical axis of the turret and that the right-angle gib-bearing A^2 is disposed to the front of such axis, thereby providing a plurality of widely separated bearing portions between the carriage and the turret-slide calculated to effectually overcome any tilting or deflecting movement of the turret. It is evident of course that the particular details of structure and their exact disposition with respect to each other and the axis of the turret are not essential, but may be varied in securing the plural number of separate transverse bearings for the turret, whereby the objections hereinbefore indicated are overcome, and any usual means may be employed to move or adjust the turret-slide transversely of the carriage, as generally indicated at A^2, Fig. 1.

Projecting upward from the bottom slide B is the tapering spindle or pin D, the lower portion of which is preferably cylindrical and firmly secured in the said slide B. Rotatably mounted upon the tapering spindle D is the turret-block C, bored to receive a tapering bush c, which latter is adjustably held in position by means of the adjusting-screws c' and the jam-nut c^2. From this construction it will be seen that an accurate fit of the bush and tapering spindle D can at all times be maintained and the bush adjusted to take up wear, whereby the turret-block may at all times be maintained in accurate position with respect to its vertical axis and all lost motion be prevented. The upper portion of the tapering spindle is provided with a suitable device for holding the turret-block down upon the spindle, and in the present instance such device comprises the screw-threads c^3 and nut c^4; but such details may obviously be varied without departing from the spirit of the invention. As an additional means for restraining the turret-block C in proper position upon the spindle D the upper end of said spindle is reduced in diameter, and over it is placed a holding-cap D′, the latter being forced downward upon the block by means of a suitable handle D^2, having a hub D^3 in suitable screw-thread connection with the reduced end of the spindle.

It is essential when the turret has been turned or adjusted with the tool in position that it be locked securely and that no lost rotary motion be permitted by the locking instrumentalities. To this end the lower surface or bottom of the turret-block C has secured thereto in suitable manner a steel locking-ring E, which enters a suitable circular slot E′, formed in the bottom slide B, and has a series of recesses $e\ e$ corresponding to the faces of the turret, as will be understood by one skilled in the art. Disposed substantially radial of the turret-slide B is the locking-plunger F, having a slot or recess f formed between its ends, as shown in Figs. 2, 3, 4, and 5, said slot being of sufficient size to permit the locking-ring E to move freely through it when the locking-plunger is withdrawn to bring said slot or recess in register therewith. One end wall f' of the slot is formed to fit the series of recesses $e\ e$ in the locking-ring, said recesses and wall f' being preferably somewhat beveled to form a close fit without play or lost motion. It will be noted in this connection, Figs. 2 and 3, that the locking-plunger F has a bearing in the bottom slide B on both sides of the locking-ring at x and y, so that said plunger is guided and steadied at both sides of the locking-ring and fixedly held at these points when in locking engagement with the ring.

Secured to the inner end of the locking-plunger is a pin g, which extends through the spindle D, the bottom slide being counterbored on the side opposite the locking-plunger to accommodate a spring h, disposed about the pin g and between a compression-nut h', screw-threaded to the end of said pin g and the inner end h^2 of the counterbore. Thus

the normal force of the spring is exerted to draw the locking-plunger inward into locking engagement with the locking-ring, and said spring is also entirely covered and out of the way of other parts.

Mounted on a stud *i*, secured to the bottom slide, is a withdrawing handle I, which is connected by a suitable pin *i'* to the outer end of the locking-plunger F, whereby the locking-plunger may be withdrawn from locking engagement with the locking-ring E against the tension of the spring *h*. When the locking-plunger is thus withdrawn, the end thereof will bear upon the outer surface of the ring until the next recess *e* comes opposite the end of said locking-plunger, at which time the spring *h* will cause the engagement of the locking-plunger with said recess.

As hereinbefore pointed out, it is desirable that there should be no lost motion between any of the parts of the locking instrumentalities, and we have therefore disposed alongside of the locking-plunger in a suitable recess formed in the bottom slide a tapering gib *j*, which as wear takes place between the locking-slide and its bearings may be adjusted to take up all lost motion. It is of importance also that the locking-plunger shall have bearing-points on the opposite sides of the locking-ring, as shown at *x* and *y*, Fig. 3, as thereby all liability of spring or give in the substance of the locking-plunger is overcome, and the said plunger is held in fixed relation with the bottom slide and locking-ring.

The operation of the device will be readily understood by those skilled in the art from the above description. The turret-block being in position, it is only necessary to release the cap D' by turning the handle D^2, then withdrawing the locking-plunger by means of the handle I, whereupon the turret-block may be turned in the desired position until the locking-plunger can engage the recesses in the locking-ring, whereupon by setting up on the handle D^2 the turret-block is clamped in its position for use. Should the wear between the tapering spindle D and the turret-block C be appreciable, it is only necessary to adjust the tapering bush C to accommodate any condition and take up all lost motion.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a turret-lathe, the combination of a carriage, a turret movable transversely of said carriage, a transverse dovetail bearing connecting the turret and carriage at the rear of a transverse vertical plane passing through the axis of the turret, and a right-angle gib-bearing connecting the turret and carriage and disposed in front of said transverse vertical plane passing through the axis of the turret to prevent any backward tilt to the turret due to the strain of the cutting-tool.

2. In a turret-lathe, the combination of a carriage, a turret mounted thereon, a transverse dovetail bearing connecting the turret and carriage in the rear of a transverse vertical plane passing through the axis of the turret, said carriage being provided in front of said transverse vertical plane with an inverted-L-shaped projection, the turret having a lip extending in front of said projection, and a right-angle gib secured to said lip and extending beneath the overhang of said inverted-L-shaped projection.

3. In a turret-lathe, the combination of the turret-spindle, the bottom slide provided with a circular slot, the turret-block mounted to turn on said spindle and slide and having a locking-ring projecting into and fitting said circular slot, said ring in the portion thereof within the circular slot being provided with a series of beveled or tapering recesses, a locking-plunger having a bearing in the bottom slide on each side of the circular slot, said plunger having a beveled or tapering wall to enter the reversely beveled or tapered recesses in the locking-ring, a pin secured to the end of the locking-plunger passing through and guided by the turret-spindle, and a spring wholly inclosed within the bottom slide and connected to said pin, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

RICHD. K. LE BLOND.
WILLIAM F. GROENE.

Witnesses:
FRED. LE BLOND,
CLARENCE EICH.