(No Model.) 2 Sheets—Sheet 1.

F. H. RICHARDS.

TURRET MECHANISM.

No. 517,168. Patented Mar. 27, 1894.

Fig. 1

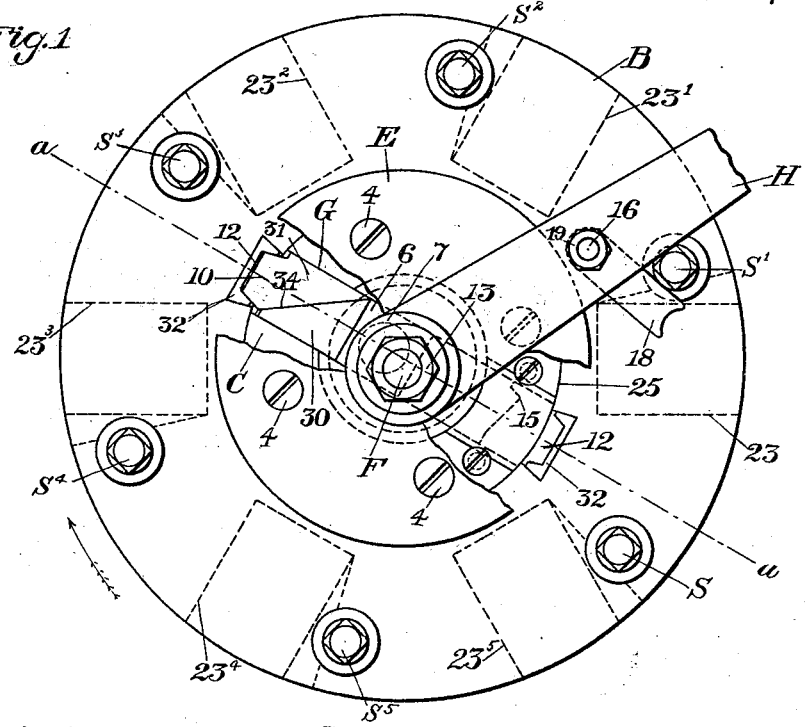
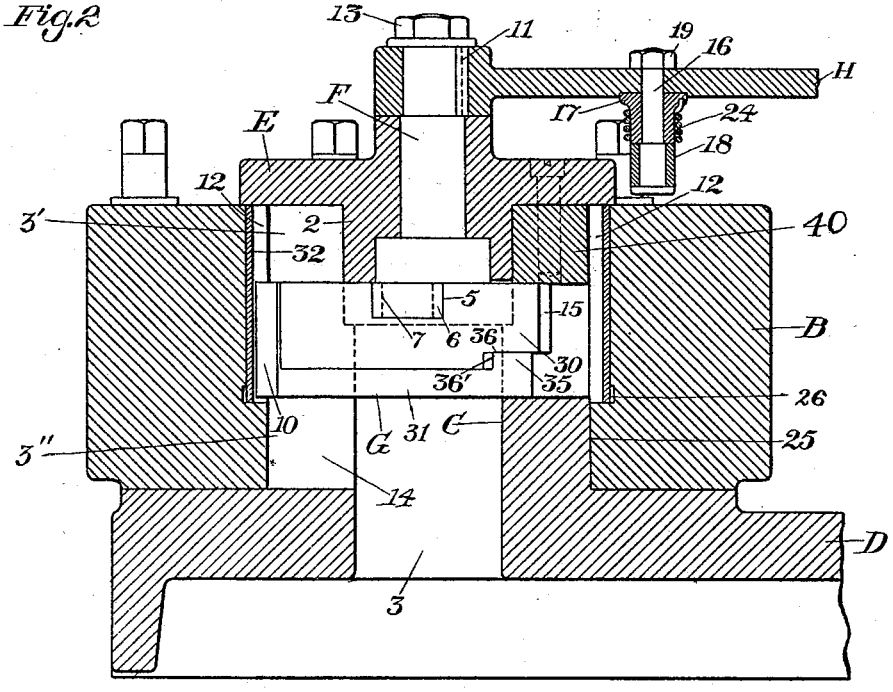


Fig. 2



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

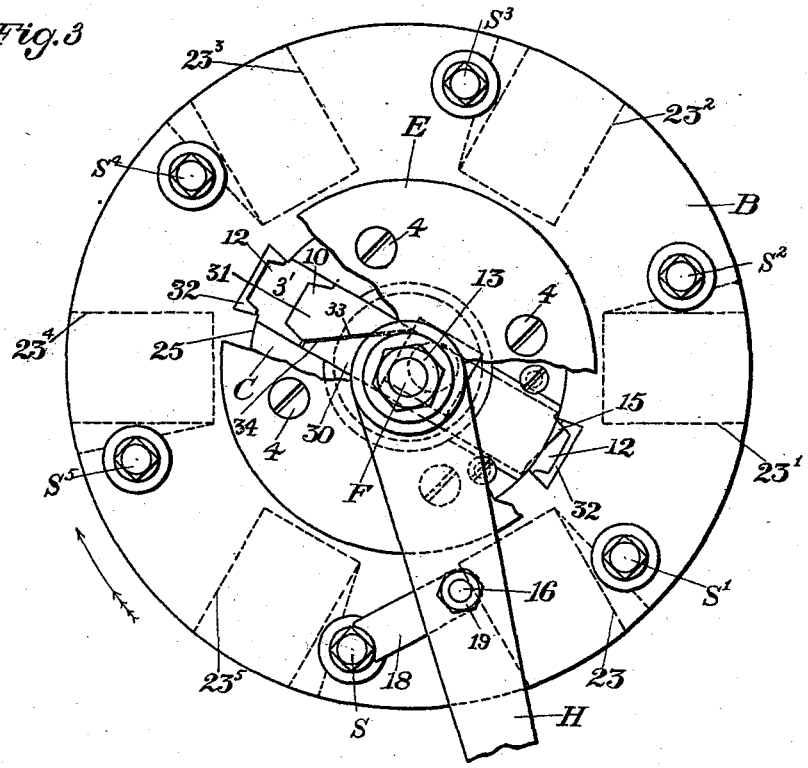


Fig. 9

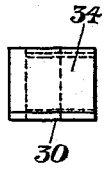


Fig. 8

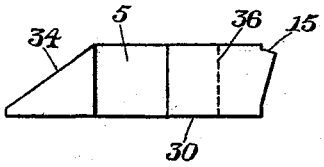


Fig. 5

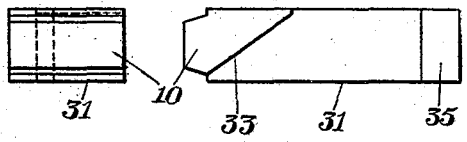


Fig. 4

Fig. 10

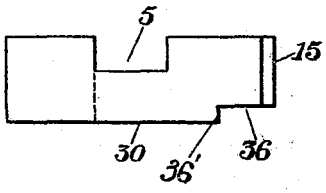


Fig. 11

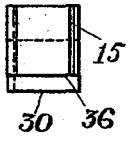


Fig. 6

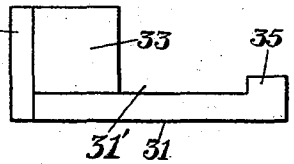
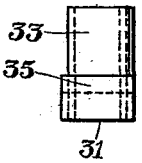


Fig. 7



Witnesses:
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UNITED STATES PATENT OFFICE.

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TURRET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 517,168, dated March 27, 1894.

Application filed December 7, 1893. Serial No. 493,066. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Turret Mechanism, of which the following is a specification.

This invention relates to turret-locking and clamping devices for lathes, and to that class of turret locking and clamping devices in which the turret is locked against rotation on the turret-supporting column by means of a lock-bolt, and is simultaneously clamped thereon by expanding said column within the turret.

The invention is in the nature of an improvement on the turret-clamping mechanism described and claimed in Letters Patent of the United States, No. 480,964, dated August 16, 1892, to which reference may be had.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of the turret of a turret-lathe mounted on its supporting column, (some of the parts are broken away to show better the construction and operation of the device,) embodying my present invention. Fig. 2 is a vertical section of a portion of the turret-carriage and its turret-supporting column with the turret mounted thereon. Fig. 3 is a view similar to Fig. 1, but showing the actuating parts in a different position. Fig. 4 is a plan view of one portion of the lock-bolt. Fig. 5 is an end view of the part shown in Fig. 4, as seen from the left-hand in said figure. Fig. 6 is a side elevation of the same as seen from below. Fig. 7 is a view of the right-hand end of the same. Fig. 8 is a plan view of the other portion of the lock-bolt. Fig. 9 is a view of the left-hand end of the same. Fig. 10 is a side view of the part shown in Fig. 8, as seen from below in said figure. Fig. 11 is a view of the left-hand end of the same.

Similar characters designate like parts in all the figures.

My improved turret mechanism consists, essentially, of an expansible column, a turret revolubly mounted on said column and having notches whereby it may be locked in successive positions, and improved turret-locking means for simultaneously locking the turret and expanding the column within the turret. For actuating said turret-locking clamp, any suitable device, as, for instance, a cam or crank, may be provided, attached to an operating handle, which is a preferable form of construction.

In the drawings, the turret, which is designated in a general way by B, is shown revolubly mounted upon a column, C, that may be formed integral with the usual turret-carriage, a portion of which is shown in section in Fig. 2, and there designated by D.

The turret B is shown arranged for carrying six tools, (the more frequent number,) and the turret-actuating and locking mechanism is shown constructed and arranged for bringing each of the six tools successively into its proper working position. The operation of this mechanism is independent of the advancing and retracting movements of the turret-carriage. It nevertheless may be used as an automatic revolving turret-head, operable by the sliding movement of the carriage.

The turret B is held in place on the column C by means of a cap, E, whose hub, 2, fits into the upper end of the bore, 3, of the column. Said cap is shown secured to the column by means of suitable screws, as 4, and forms the bearing for the crank-shaft F.

The vertical turret-supporting column C will have a mortise, 3′, formed transversely through it from side to side as shown in the drawings, to receive a sliding bolt or turret-locking and column-expanding device, designated in a general way by G. This mortise 3′, in practice, will be of a width substantially equal to the width of the sliding bolt, and will extend from the upper edge of the column to a point in alignment with the bottom line of the bolt at both sides of said column. In Fig. 2 of the drawings, it will be noticed that the mortise 3′ at the left-hand side of the column is continued, as shown at 3″, below the bottom line of the bolt to a point in alignment with the base of the turret, the object of said extension being to secure additional elasticity of the column to permit expansion thereof with the least exertion of power. The mortise 3″ will be of less width than the mortise 3′, to form a shoulder or bearing for the work-

ing or left-hand end of the bolt. It will, however, be obvious that the mortise at the right-hand side of said column may be substantially like the one at the left-hand side and extend to the base-line of the turret.

The turret-locking and column-expanding device hereinbefore referred to as the sliding bolt G, comprises two wedge-like members, or parts, one of which members is herein termed the "lock-bolt slide" and is designated by the numeral 30, and the other of which members is termed the "lock-bolt" and is designated by the numeral 31. The lock-bolt member 31 is constructed to fit the mortise of the turret-supporting column, and to have a bearing therein at both sides of the axis thereof, and is mortised transversely to receive the lock-bolt slide member, which member 30 is of a width substantially equal to the width of said lock-bolt, and is mortised, as at 5, see Fig. 8, to receive the sliding crank-pin block 6 that is carried by the crank-shaft F and which actuates the lock-bolt slide to throw the lock-bolt outward into engagement with the turret, as will be hereinafter more fully described.

The two members 30 and 31 comprising the sliding-bolt G have an interlocking engagement one with the other. To accomplish this, the lock-bolt slide 30, which is preferably rectangular in cross-section, is beveled or inclined at one end thereof, as shown at 34 in Fig. 9, and the lock-bolt is recessed or grooved at its upper face transversely and longitudinally as shown at 31′, Fig. 4, to correspond with and receive said slide, the head or working-end of the lock-bolt member 31 being inclined, as at 33, at one side thereof to correspond with the inclined point of the lock-bolt slide.

It will be seen, by reference to Fig. 2 and by a comparison of Figs. 4 and 8, that the lock-bolt 31 and lock-bolt slide 30 are of approximately equal length and of substantially equal width, and that both members, by their peculiar construction, will have long side-bearings against adjacent sides of the mortise 3′ in the turret-supporting column, and will extend, during all positions of the sliding bolt G, at both sides of the axis of the column C. By this construction, the lock-bolt which supports the lock-bolt slide may be of a length considerably greater than the diameter of the vertical bore, 3, of the turret-supporting column, thus securing a longitudinal bearing of a length that will preclude any possibility of lateral displacement or distortion and will insure a positively direct movement of the lock-bolt during operation in exact alignment with the lock-bolt notch of the turret it is to engage.

Another object of constructing the lock-bolt and lock-bolt slide of equal width, and assembling them in vertical alignment, as shown in the drawings, is to permit the power to be applied equally to both members in a line central with relation to the width thereof. The forwardly-projecting end 10 of the member 31 is wedge-shaped to exactly fit the notches 12 of the turret, to lock the turret against rotation on the column C. Said notches may be formed in the turret itself, or in steel keys, as 32, inserted in the turret as shown in the drawings. The inclined face 34 of the member 30 engages the corresponding face 33 of the member 31 to advance the bolt and lock the turret against rotation; at the same time the members 30, 31 act as wedges to expand the column within the turret, thereby clamping said turret and column together on the full forward movement of the lock-bolt. The lock-bolt slide member 30 is notched as at 36 to form a shoulder, 36′, which engages a projection, 35, formed at the rear end of the lock-bolt 31, and thus insures the drawing back of said member 31, and the unlocking of the turret on the retraction of the member 30 by means of the crank-shaft F and its actuating device.

As shown at the right-hand in Figs. 1, 2 and 3 of the drawings, a block, 40, is secured in the mortise 3′ of the turret above the sliding bolt. This block is provided to prevent the impingement of the rear end of the sliding bolt between adjacent walls of the mortise when the column is expanded at the opposite side. This block may be either secured to the column C by set-screws as shown in Figs. 1 and 3, or be secured to the cap E as illustrated by dotted lines in Fig. 2, the last-mentioned arrangement being preferable, as it permits the removal of the block and cap together.

By the construction of the turret-supporting column with its opposite sides mortised from the extreme upper edge thereof to a point near the lower edge, the sliding-bolt members may be inserted and removed in an assembled condition without the necessity of removing the turret from the column, which is of great consideration.

For actuating the crank-shaft F, this is provided with a lever, H, which is fixed to the upper end of said shaft by means of a nut, 13, and key, 11; by means of this lever being connected with shaft F, the operator may turn the crank to advance or retract the lock-bolt. By pushing the lever from him into the position shown in Fig. 1, the operator throws the lock-bolt forward toward the left-hand, into engagement with one of the notches 12; by continuing said movement of the lever, the inclined faces of the parts 30 and 31 act as wedges to spread apart the lock-bolt parts and thus expand the column C within the turret, thereby doubly securing the turret in position; to facilitate which purpose, the column C is split on one side, as at 14, to permit of said expansion.

A projection or stop, 15, is formed on the right-hand end of the lock-bolt to limit the forward movement of the turret by engaging one of the notches 12 when said bolt is fully retracted, as illustrated in Fig. 3.

By the term "forward movement," as ap-

plied to the turret, is meant the movement of the turret in the direction of the arrow shown in Figs. 1 and 3.

The lever H serves also, after the partial retraction of the lock-bolt, as a means for turning forward the turret. For this purpose said lever is provided with a stud, 16, furnished with a collar or thimble, 17, and carrying a pawl, 18, the parts being held in place by means of the nut 19. A spiral spring, 24, carried upon the thimble 17, (one end being fixed in said thimble and the opposite end in the pawl 18,) normally holds said pawl in position to engage any one of a series of studs; in the present case, six in number are used, to correspond with the number of tool-sockets, 23, formed in the turret, as indicated by dotted lines in Figs. 1 and 3; said studs are designated by S, S′, S^2, S^3, S^4, and S^5, which are fixed in the turret B, the pawl 18 engaging said studs after the manner of a ratchet to rotate the turret. In practice, the "studs S" are the upper ends of the binding-screws used for holding the tools (not herein shown) in place in the turret.

The preferred construction of the turret, whereby it is fitted to receive the keys or abutments 32, and the proper operation in connection with the said keys of the lock-bolt G, are provided for, (see Figs. 1 and 2.) In making the turret, after the bore 25 thereof is finished, a series of milling cuts, as 26, are made therein; also, the grooves 32′ for the keys 32, are formed extending from the upper side of the turret downward to said cuts 26, the cuts 26 being only for facilitating the making of the grooves. Into these grooves the keys 32, usually and preferably of tempered steel, are firmly driven or forced (by means of a power-press or other apparatus), for receiving the aforesaid turret-engaging pin and lock-bolt G.

When constructed as herein described, the turret-abutments 12 lie entirely outside of the turret-supporting column C; the notches 12 will be formed in the turret when this is made of suitable material therefor.

The general operation of the mechanism is as follows: In Fig. 1 the turret is shown locked in the proper position for holding the tool-socket 23^3 in the "working position," and the crank-lever is shown in its corresponding position, being thrown back farthest from the operator. It being desired to bring the next tool-socket, 23^4, into that position, the operator grasps the lever H and pulls it toward him. During the forward stroke of the lever, the pawl 18, by means of the spring 24, is brought into its working position ready to engage the pin or stud S. On the first forward movement of the lever from its position in Fig. 1 to its position in Fig. 3, the lock-bolt slide 30 is drawn back by means of the aforesaid crank-pin 7, which brings the shoulder 36 thereof against the projection 35 of the lock-bolt, carrying said bolt backward out of engagement with and unlocking the turret; at the same time the pawl 18 engages the stud S. The operator continuing to pull forward the lever H, the turret is turned on its pivot-column C to bring the socket 23 into working position. During the latter part of the above-described movement the lock-bolt is drawn farther back until the projection 15 on the rear end thereof engages one of the turret-abutments 12, thus preventing any further forward or rotary movement of the turret, and leaving this in position for locking. The lever H is next thrown back to the position shown in Fig. 1, the lock-bolt engaging the next key and operating to forcibly expand the turret-column within the central bore, 25, of the turret. By means of the wedge-shape of the key 12 and of the corresponding end 10 of the lock-bolt, the play due to imperfect fitting or wear between the key and lock-bolt is taken up; and by the expansion due to the said inclined faces of said lock-bolt, any play or wear normally existing between the lock-bolt and the walls of the column is also taken up; and as a result of the expansion of the bolt to take up its play as aforesaid, the column C is itself expanded within the bore, 25, of the turret; so that on the complete locking of the turret by forcing the lever to its position shown in Fig. 1, all of the said interlocking parts are forced or abutted the one upon the other, thereby taking up all play and freedom of fitting, and producing a firm and rigid locking and clamping of the turret. On the movement of the hand-lever H in the direction of the arrow (Fig. 3), the crank draws the lock-bolt slide 30 toward the left hand in Fig. 1, the part 31 remaining at rest until the inclined face 34 of the part 30 meets the corresponding face 33 of the part 31, when, during the further motion of the part 30, said part 31 is carried therewith as illustrated in Fig. 1. The force applied to the lock-bolt being communicated to it through the inclined faces 33 and 34, (these being suitably proportioned therefor, substantially as shown,) the greater the thrust upon the slide 30, the more forcibly said lock-bolt is engaged with the turret, so that on forcing forward the slide to expand the column C within the turret, the lock-bolt is brought into engagement with the turret with a corresponding power. The position of the crank-pin 7 (shown by a dotted line in Fig. 1) relatively to the line of movement (*a*—*a*, Fig. 1) of the lock-bolt when the lock-bolt is forced into engagement with the key 12 as in Fig. 1, should be adjacent to the true "dead-center" of said crank, so that the crank-shaft F is thereby effectively held by the friction of the parts in position for preventing accidental retraction of the lock-bolt, without any necessity for using auxiliary devices for so retaining said shaft.

Having thus described my invention, I claim—

1. The improved turret-mechanism herein described, consisting of a tubular turret-sup-

porting column, grooved or mortised transversely at opposite sides from its upper end to a point near its lower end, a turret revolubly supported upon said column and having lock-bolt notches, a sliding lock-bolt comprising two interlocking wedge-members both of which have bearings in said column-mortise at both sides the center thereof for the purpose set forth, and a lock-bolt actuator adapted for moving said bolt transversely of the column into engagement with the lock-bolt notches and for simultaneously expanding the column by spreading the lock-bolt members, substantially as and for the purpose set forth.

2. The improved turret-mechanism herein described, consisting of an expansible turret-supporting column grooved or mortised transversely through its entire diameter and from its upper end to a point near its lower end, a turret revolubly supported upon said column and having lock-bolt notches, a locking-device, comprising a lock-bolt member having a sliding bearing in the turret-column at both sides the axis thereof and having a lock-bolt-engaging head and a retracting-projection, and a slide supported by said lock-bolt in interlocking engagement therewith, and having bearings each side the axis of the turret, and a lock-bolt actuator in engagement with the slide and adapted for actuating said slide to move said lock-bolt transversely of the column into engagement with the notches of the turret and simultaneously expand the column by spreading the two said members, substantially as and for the purposes set forth.

3. The combination with the turret-supporting column recessed or slotted substantially as described, and with the turret revolubly supported upon said column and having notches therein, of a turret-locking device consisting of two wedge-like members of substantially equal width having a bearing one upon the other and each having bearings in the column at both sides the axis thereof, one of said members being adapted to be moved by the other into engagement with the notches of the turret, and the other being capable of lateral movement for spreading the column, and means for actuating said members, substantially as and for the purpose set forth.

4. The combination with the turret-supporting column recessed transversely from side to side as described, of the turret revolubly supported upon said column and having lock-notches therein, a turret-locking and column-expanding device consisting of a sliding lock-bolt of a width substantially coinciding with the width of the mortise in the column and having a bearing therein at both sides the axis thereof and a lock-bolt slide supported by said lock-bolt in vertical alignment therewith, both of said parts having side bearings approximately their entire length both sides the axis of the turret and being adapted to be moved longitudinally and to be simultaneously spread to lock the turret and expand the column, and means for actuating said device, substantially as and for the purpose set forth.

5. In a turret-mechanism, the combination with the turret-supporting column recessed or slotted transversely from side to side, as described, and with the turret revolubly supported upon said column and having lock-notches adjacent to said column, of the transversely-recessed lock-bolt 31 having a bearing in the column at both sides thereof and having the notch-engaging head 10, inclined face 33 and retracting-projection 35, the lock-bolt slide seated in said recess intermediate to the inclined face 33 and projection 35, and having the inclined face 34 to engage the inclined face 33 of the head of said bolt, and the shoulder 36′ to engage the projection 35 of said bolt, and the bolt-actuator engaging said slide to move the bolt into engagement with one of the notches of the turret and simultaneously expand the turret-column by a movement of the slide 30 transversely of the bolt 31, substantially as and for the purpose described.

6. In a turret-mechanism, the combination with the transversely mortised turret-supporting column, and with the turret revolubly supported by said column and having lock-notches upon its inner face, of two sliding lock-bolt members, one of which is carried by the other, and both of which have bearings in the column-mortise at each side the center thereof, and means for throwing one of said members into engagement with a lock-notch of the turret and subsequently move the other of said members laterally with relation to the first member to spread the supporting-column, substantially as described and for the purpose set forth.

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