(No Model.) 2 Sheets—Sheet 1.

# F. H. RICHARDS.

## TURRET MECHANISM.

No. 480,964. Patented Aug. 16, 1892.

Fig. 1

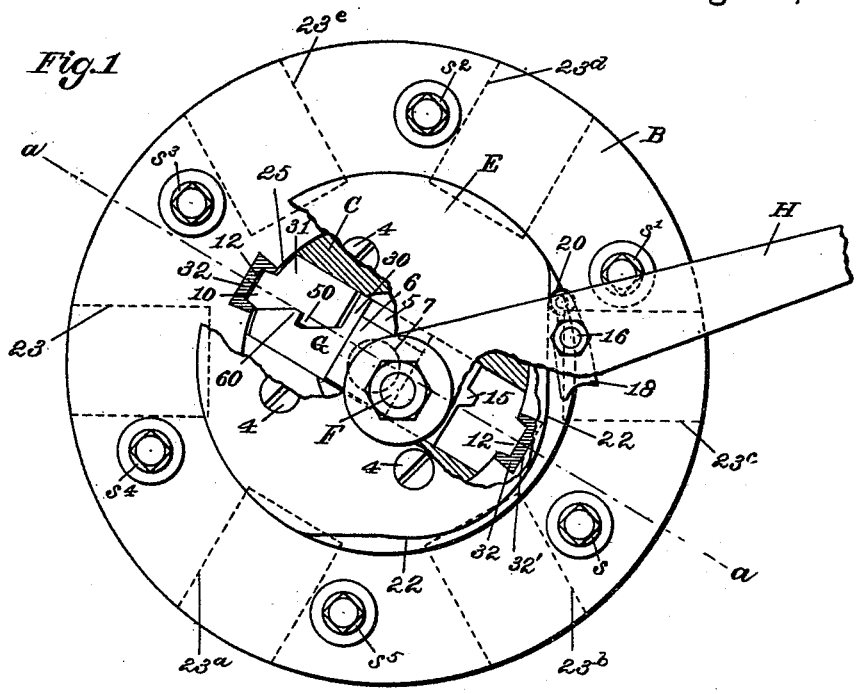
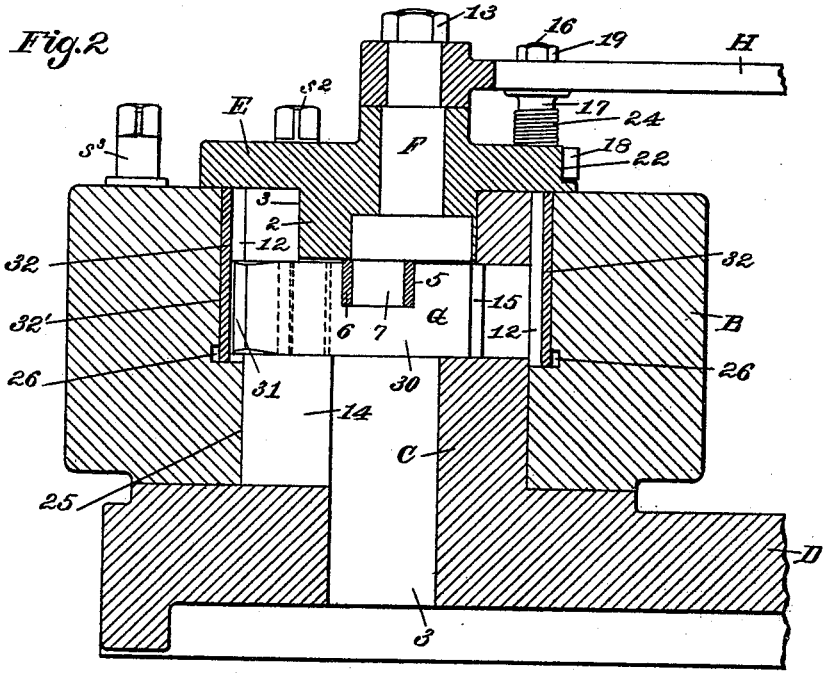



Fig. 2

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(No Model.) 2 Sheets—Sheet 2.

# F. H. RICHARDS.

## TURRET MECHANISM.

No. 480,964. Patented Aug. 16, 1892.

Fig. 3

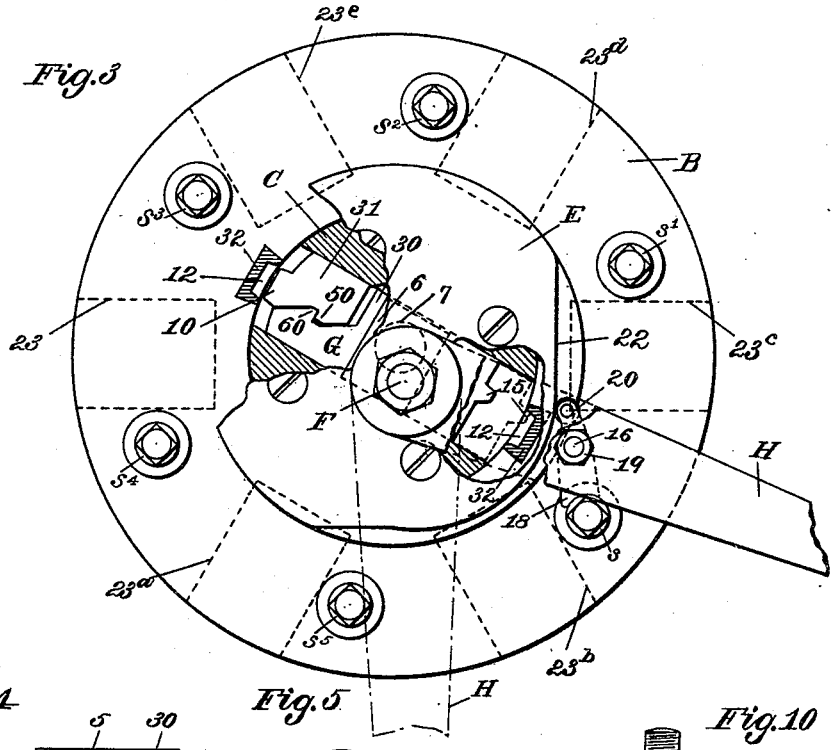



Fig. 4

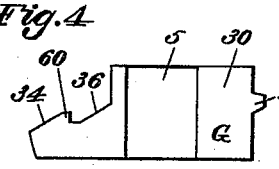



Fig. 5

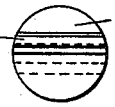



Fig. 10

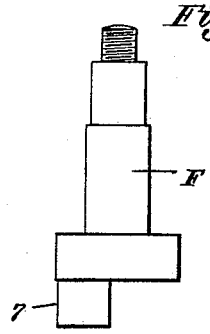



Fig. 6

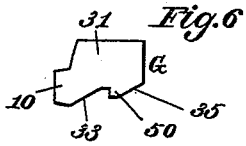



Fig. 7

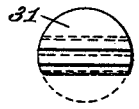



Fig. 8

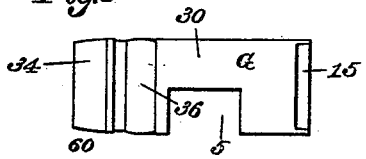



Fig. 9

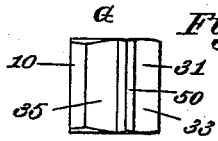
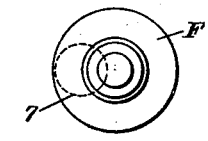



Fig. 11

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# UNITED STATES PATENT OFFICE.

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## TURRET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 480,964, dated August 16, 1892.

Application filed November 23, 1891. Serial No. 412,867. (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 mechanisms for lathes, and is in the nature of an improvement on the turret-clamping mechanism described and claimed in my application, Serial No. 412,866, filed November 23, 1891.

In the drawings accompanying and forming part of this specification, Figure 1 is a top or plan view of a lathe-turret furnished with my improved locking mechanism, some parts being broken away the better to show the construction and operation of the several details. Fig. 2 is a vertical section in line *a a* of Fig. 1, showing, also, a portion of the usual turret-slide. Fig. 3 is a view similar to Fig. 1, showing the parts in a different position. Fig. 4 is a plan view of the locking-bolt slide. Fig. 5 is an end view of the same as seen from the right hand of Fig. 4. Fig. 6 is a plan view of the lock-bolt. Fig. 7 is an end view of the same as seen from the right hand of Fig. 6. Fig. 8 is a side view of the lock-bolt slide as seen from above in Fig. 4. Fig. 9 is a side view of the lock-bolt as seen from below in Fig. 6. Fig. 10 is a side elevation of the bolt-actuating crank-shaft. Fig. 11 is a plan view of said crank-shaft.

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 same. For actuating said turret-locking means any suitable device—as, for instance, a cam or crank—may be provided, and for operating said bolt-actuating means a hand-lever is deemed preferable.

In the drawings the turret, which is designated in a general way by B, is shown revolubly mounted upon a column C, that is or may be formed integral with the usual turret-slide, a portion of which slide 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 proper working position. The operation of this mechanism is independent of the advancing or retracting movements of the turret-slide.

The turret 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 said 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 column C is bored crosswise thereof to receive the sliding lock-bolt G, (shown in detail in Figs. 4 to 9, inclusive,) which has a mortise 5 formed therein to receive the sliding crank-pin block 6, that is carried by the crank-pin 7 of the crank-shaft F. The lock-bolt G is formed of two parts, of which the larger part 30, termed the "lock-bolt slide," is actuated by the crank-shaft F and is notched to fit and engage the smaller part 31, which constitutes the lock-bolt proper. The forwardly-projecting end 10 of said part 31 is wedge-shaped to exactly fit the notches 12 of the turret to lock the said 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 faces 34 and 36 of the part 30 engage the corresponding faces 33 and 35 of the part 31 to advance the bolt and lock the turret against rotation and at the same time act as wedges to expand the column C within the turret, thereby clamping said turret and column together on the full forward movement of the lock-bolt. 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. By means of this lever 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 con-

tinuing said movement of the lever the inclined faces of the parts 30 and 31 act as wedges to spread apart said lock-bolt parts and thus expand the stud C within the turret, thereby doubly securing said 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 shown in dotted lines, Fig. 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. The pawl 18 is or may be provided with a roller 20, carried by a pin fixed in said pawl. 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 the roll 20 of said pawl against the periphery of the cap E or against the cam-face 22, formed thereon. A series of studs, in the present case six in number (to correspond with the number of tool-sockets 23, formed in the turret, as indicated by dotted lines in the drawings) and designated by $s$, $s'$, $s^2$, $s^3$, $s^4$, and $s^5$, 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 whereby the proper operation in connection with said keys of the lock-bolt G is provided for, is illustrated in Figs. 1 and 2. When making the turret after the bore 25 thereof is finished, a series of milling-cuts, as 26, are made therein, and the grooves 32′ for the keys 32 are formed, extending from the upper side of the turret downward to said cuts 26, said cuts 26 being only for facilitating the making of the grooves. Into these grooves the keys 32, usually and preferably of steel suitably tempered, are firmly driven or forced by means of a fitting-press or otherwise for receiving the aforesaid turret-engaging end 10 of the lock-bolt.

When constructed as here described, the turret-abutments 12 lie entirely outside of the turret-supporting column C. The notches 12 may 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 proper position for holding the tool-socket 23 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 $23^a$ into that position, the operator grasps the lever H and pulls it toward him. During the forward stroke of said lever the roll 20 of the pawl 18 rides on the cam-face 22, and the pawl 18 is (by means of the spring 24) brought into its working position ready to engage the pin or stud $s$. On the first forward movement of said lever from its position in Fig. 1 to its position in Fig. 3 the lock-bolt G is drawn back by means of the aforesaid crank-pin 7 and the turret is unlocked. At the same time the pawl 18 engages the stud $s$. The operator continuing to pull forward the lever the turret is turned on its pivot-column C to bring the socket $23^a$ into working position after the manner shown and described in my said prior application. During the moving of the lever from its position in Fig. 3 to the position shown in dotted lines in said figure 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 farther forward movement of the turret and leaving this in the 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 notch or 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 return movement of the hand-lever H the crank draws the lock-bolt slide toward the right hand in Figs. 1, 2, and 3, the lock-bolt 31 remaining at rest until the hook 60 of said slide engages the corresponding hook 50 of the lock-bolt 31, when during the further retraction of the slide said bolt is carried therewith, as illustrated in Fig. 3. The force applied to the lock-bolt being communicated to it through the inclined faces 33 and 35, (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 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. In a turret mechanism, the combination, with an expansible column fitted to receive the lock-bolt and its slide, of the turret revolubly mounted on said column and having lock-bolt notches, the lock-bolt constructed to engage said turret-notches and having an incline, the slide engaging the lock-bolt by said incline, and means actuating the slide to force the lock-bolt into engagement with the turret and expand the column, whereby the turret is simultaneously locked and clamped, substantially as described.

2. In a turret mechanism, the combination, with the expansible column fitted to receive the lock-bolt and lock-bolt slide, of the turret revolubly mounted on said column and having the lock-bolt notches, the lock-bolt slide supported in the column and having an incline and a hook, substantially as described, the lock-bolt having a corresponding incline and a hook engaging the hook of the slide, and means actuating the slide to force the lock-bolt into engagement with the turret and expand the column and to retract the slide for withdrawing the lock-bolt by the engagement of said hooks, substantially as described.

3. In a turret mechanism, the combination, with the expansible column C and the turret revolubly mounted thereon, of the lock-bolt having the incline and the hook 50 and the slide having the corresponding incline, and the hook 60, engaging said lock-bolt hook, substantially as described.

4. In a turret mechanism, the combination, with the expansible column fitted to receive a lock-bolt and with a turret revoluble on said column, of a lock-bolt consisting of two parts and expansible within the column by the movement of one part relatively to the other part, substantially as described.

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