No. 657,241. Patented Sept. 4, 1900.

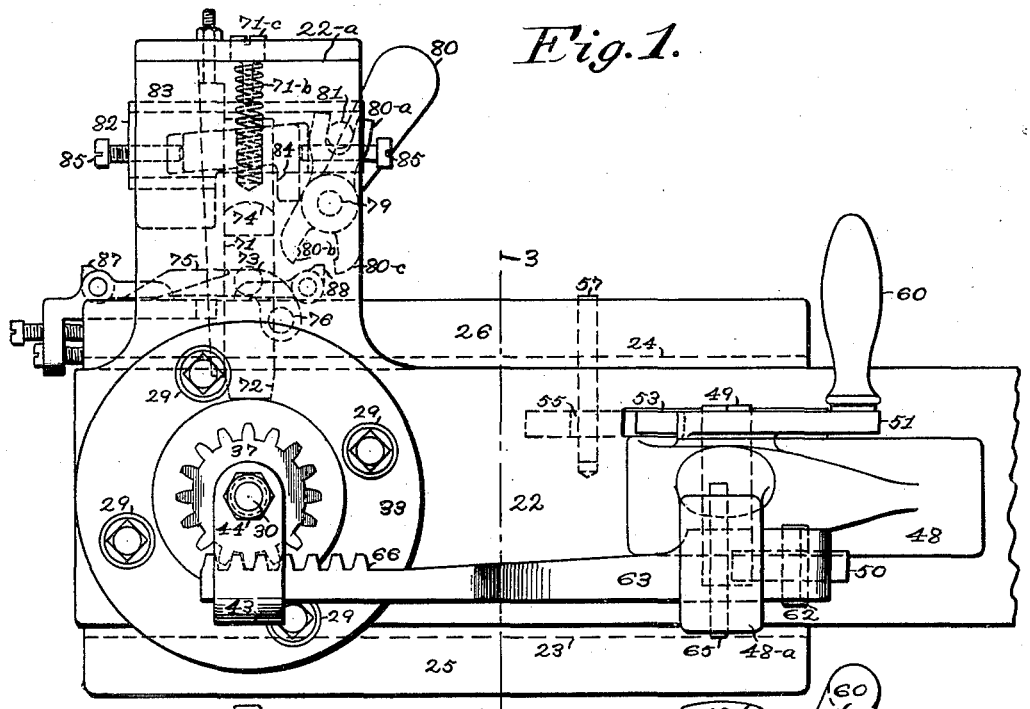
J. JETTER.

DEVICE FOR AUTOMATICALLY CLAMPING AND LOCKING TURRETS TO SLIDES OF SCREW MACHINES.

(Application filed Nov. 28, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



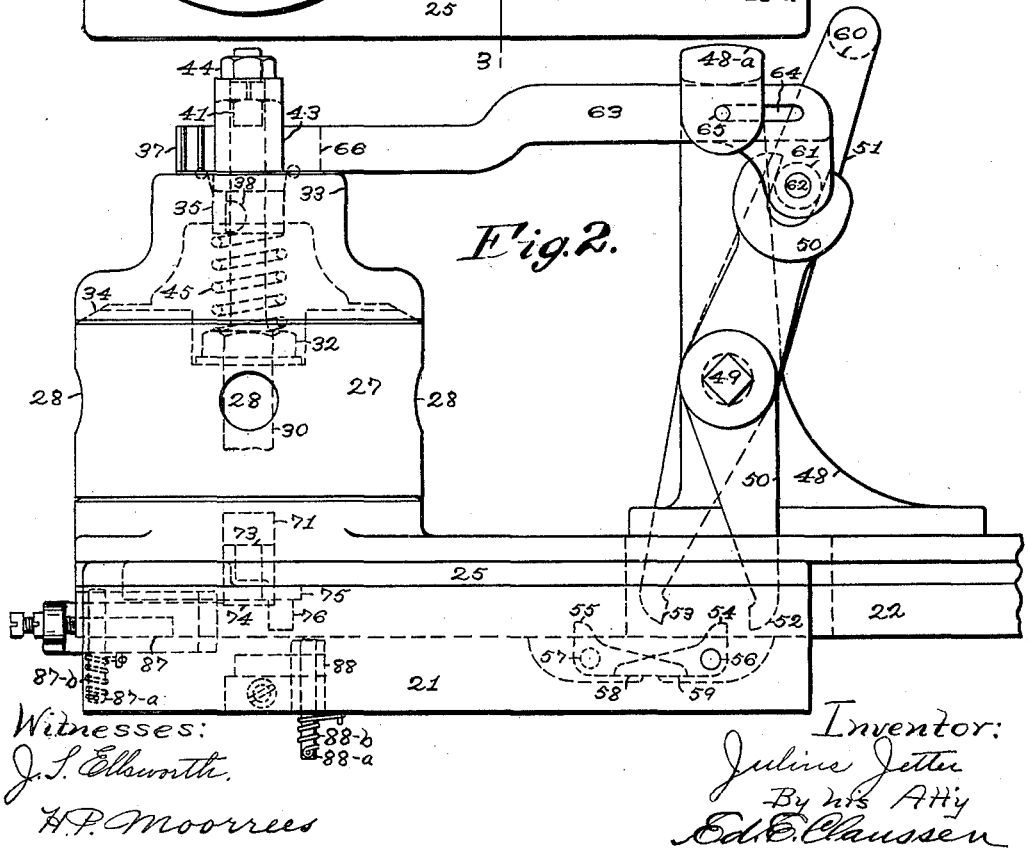


Fig. 2.

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(No Model.) (Application filed Nov. 28, 1899.) 5 Sheets—Sheet 2.

Fig. 3.

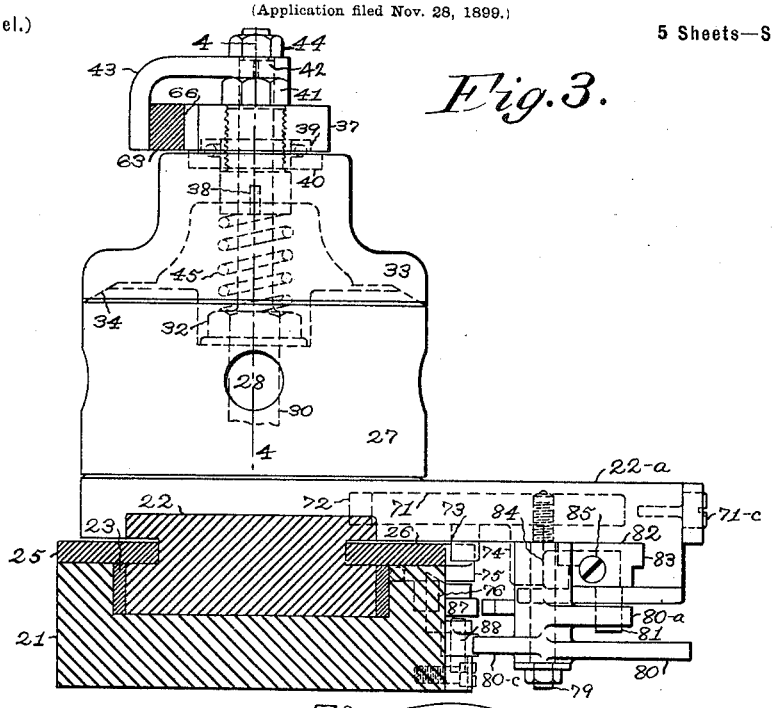


Fig. 5.

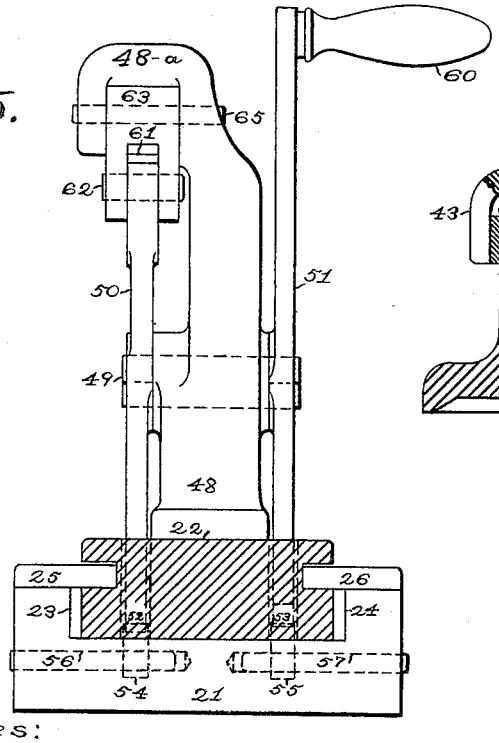
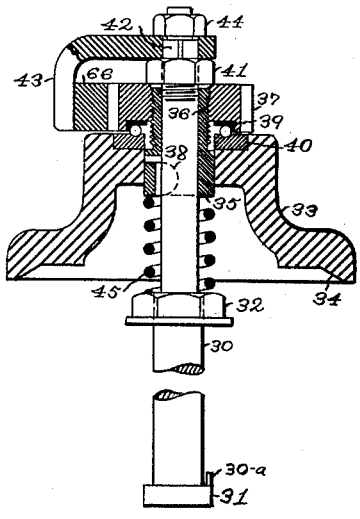


Fig. 4.



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(Application filed Nov. 28, 1899.)

(No Model.) 5 Sheets—Sheet 3.

Fig. 6.

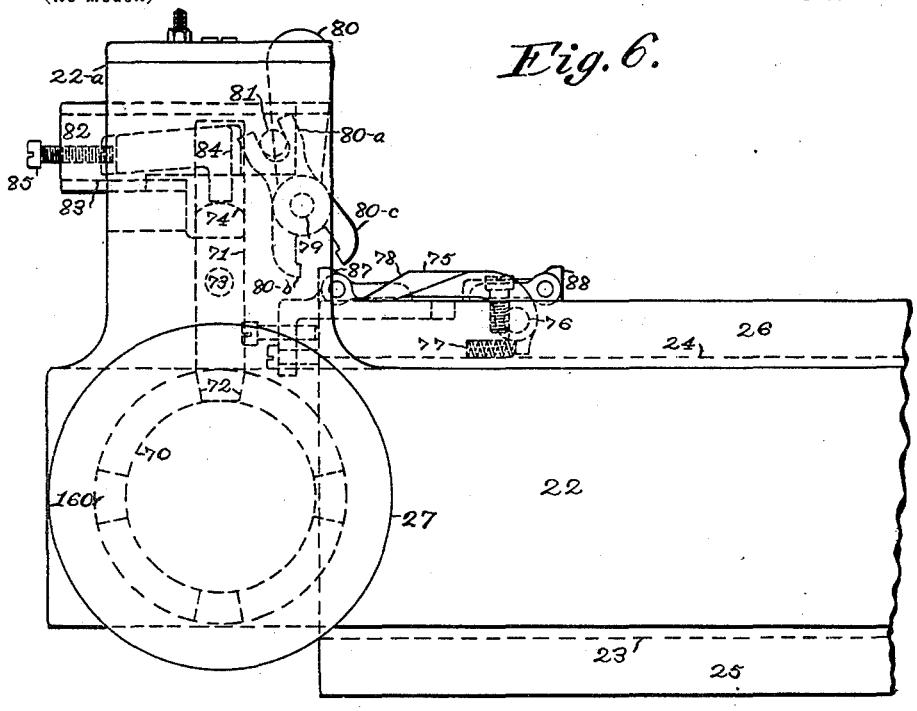


Fig. 14.

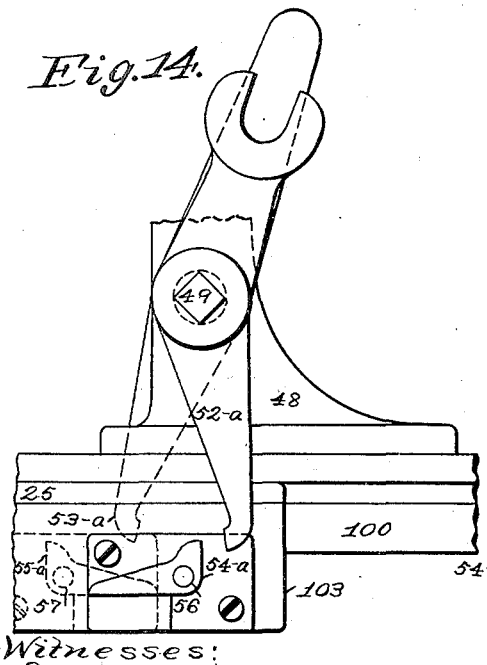
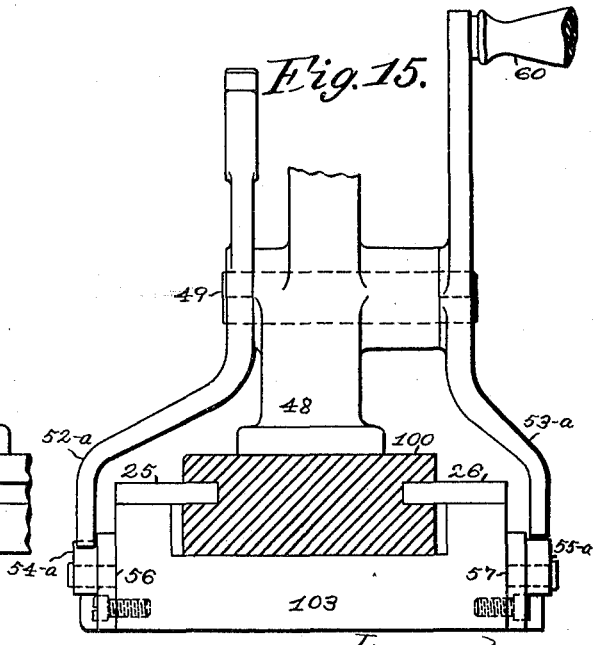


Fig. 15.



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DEVICE FOR AUTOMATICALLY CLAMPING AND LOCKING TURRETS TO SLIDES OF SCREW MACHINES.

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(No Model.) 5 Sheets—Sheet 4.

Fig. 7.

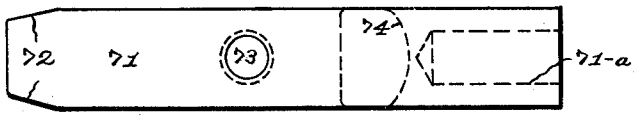


Fig. 8.

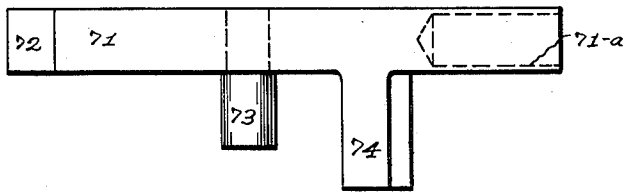


Fig. 10.

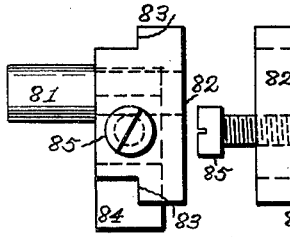


Fig. 9.

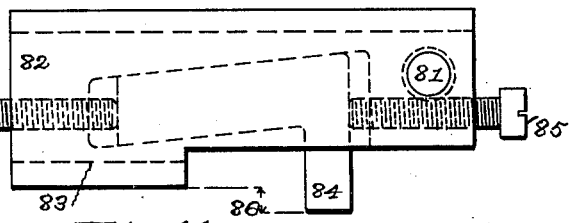


Fig. 11.

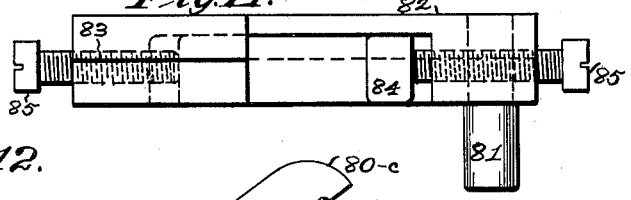


Fig. 12.

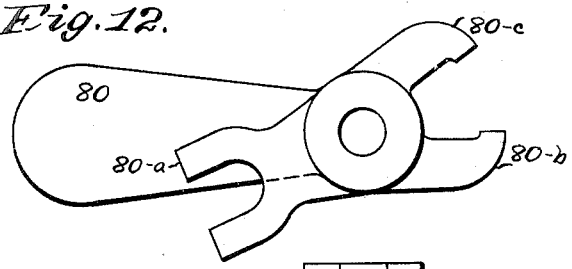
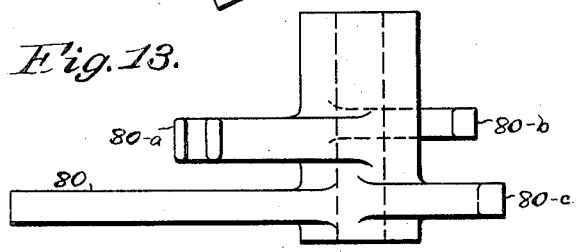


Fig. 13.



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No. 657,241. Patented Sept. 4, 1900.

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DEVICE FOR AUTOMATICALLY CLAMPING AND LOCKING TURRETS TO SLIDES OF SCREW MACHINES.

(No Model.) (Application filed Nov. 28, 1899.)

5 Sheets—Sheet 5.

Fig. 17.

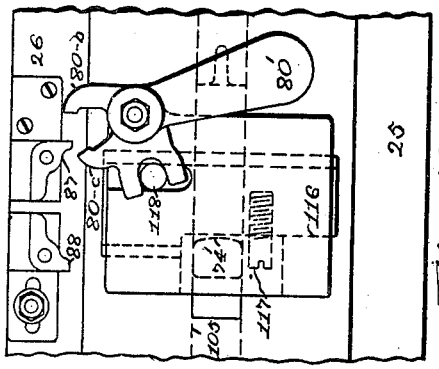


Fig. 19.

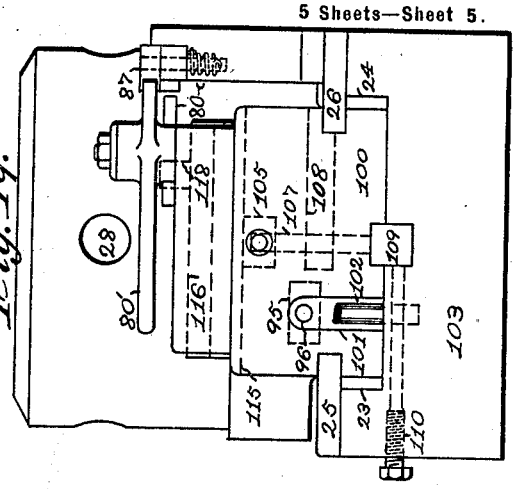


Fig. 16.

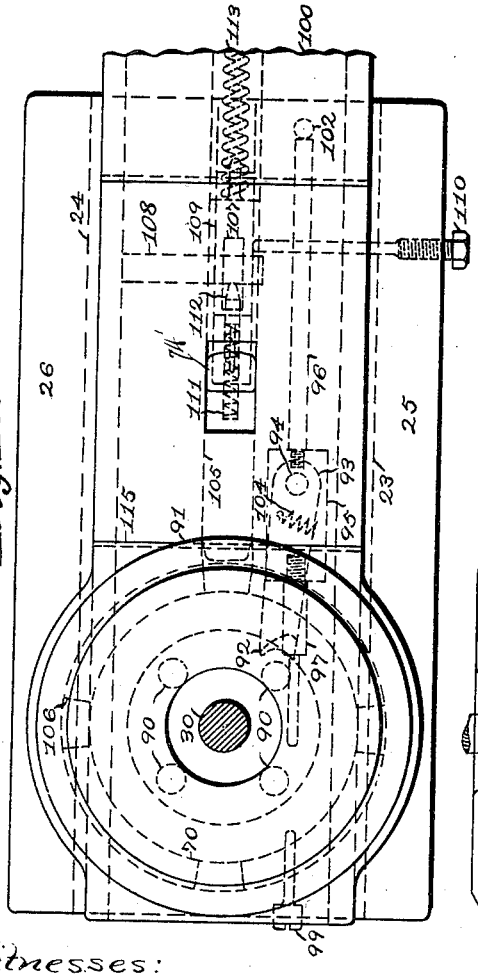
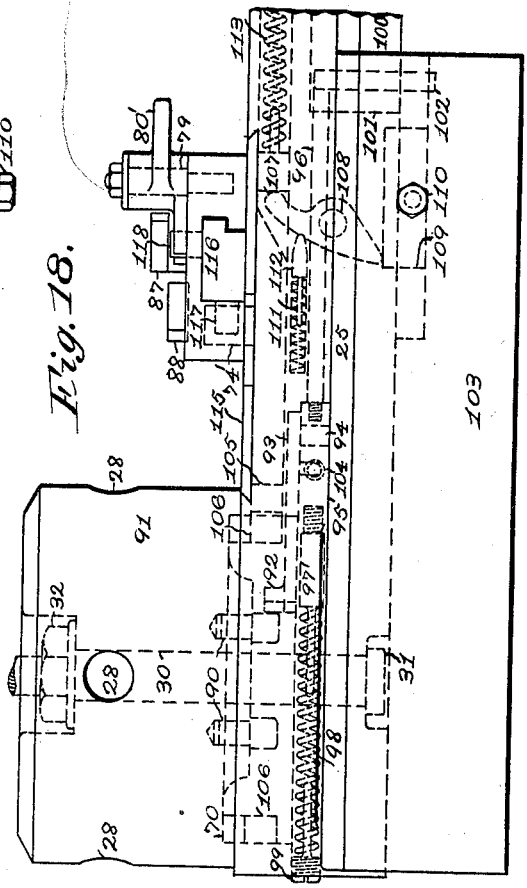


Fig. 18.



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UNITED STATES PATENT OFFICE.

JULIUS JETTER, OF HARTFORD, CONNECTICUT.

DEVICE FOR AUTOMATICALLY CLAMPING AND LOCKING TURRETS TO SLIDES OF SCREW-MACHINES.

SPECIFICATION forming part of Letters Patent No. 657,241, dated September 4, 1900.

Application filed November 28, 1899. Serial No. 738,511. (No model.)

To all whom it may concern:

Be it known that I, JULIUS JETTER, a citizen of the United States of America, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Devices for Automatically Clamping and Locking Turrets to Slides of Screw-Machines, of which the following is a specification.

This invention relates to metal-turning lathes, and more particularly to turret-lathes or turret screw-machines; and the invention contemplates certain attachments to such a turret-lathe whereby the turret is rigidly locked and clamped upon its slide when the various tools are brought to bear upon the work, thereby producing a more effective machine, and thus giving the best possible results and insuring better and more accurate work than has heretofore been obtained.

Although, as above stated, this invention has been especially devised for application to turret screw-machines, it is capable of adaptation to all types of machines where turrets are used, such as turret-lathes, monitor-lathes, valve machinery, and the various types of special machines employing turrets.

With the above-stated objects in view the invention consists in certain novel constructions and combinations of parts, which are more particularly hereinafter described, and pointed out in the claims.

The drawings which accompany and form a part of this specification illustrate an embodiment of the invention.

Figure 1 represents a plan view having my improvement applied thereto and showing the slide in its rearward position ready to be forced forward and representing that type of machines where the locking-bolt is placed perpendicular to the longitudinal movement of the slide. Fig. 2 is a side elevation of that which is shown in Fig. 1. Fig. 3 is a sectional end view taken on line 3 3 of Fig. 1, showing the mechanism that holds the locking-bolt rigidly in the turret. Fig. 4 is a vertical section through the central median line of the turret on line 4 4 of Fig. 3, showing part of the mechanism whereby the turret is clamped to the slide. Fig. 5 is an end elevation of what is shown in Fig. 2. Fig. 6 is a plan view of my invention, showing the slide in the extreme forward position ready to be forced back to the starting-point and having the stop back of the locking-bolt, thereby holding the same rigidly in its position. Figs. 7 to 13, inclusive, are details drawn on an enlarged scale, Figs. 7 and 8 being plan and side views of the locking-bolt. Figs. 9, 10, and 11 are respectively plan, end, and side views of the auxiliary slide whereby the locking-bolt is rigidly held in the turret when the tools are in operation upon the work. Figs. 12 and 13 are respectively plan and side views of the auxiliary-slide actuator. Figs. 14 and 15 are respectively side and end elevations of the modified form of the turret-clamping mechanism. Fig. 16 is a plan view of a modified form adapting my improvement to that type of machine in which the locking-bolt is placed central in a longitudinal position and in direction with the movement of the carriage and having the mechanism which operates the locking-bolt removed. Fig. 17 is a plan view of that part of the mechanism which, for sake of clearness, has been removed in Fig. 16. Fig. 18 is a side elevation of that which is shown in Fig. 16, showing the locking-bolt drawn from the turret. Fig. 19 is an end elevation of that which is shown in Fig. 18.

I will first describe the mechanism whereby the turret is rigidly secured to the slide during the time the tools are engaged upon the work.

The framework of the machine may be of any suitable form and construction adapted for carrying the several parts of the machine and also qualified to support the slide-block 21, to which is fitted for longitudinal reciprocation the slide 22, held in position by the gibs 23 and 24 and the straps 25 and 26. On the forward end of the slide is mounted the turret 27; but the mechanism for operating the slide back and forth I have omitted, for that mechanism can be of any desired construction well known to the art. The turret 27 is provided with openings 28, adapted to receive the tools, which are held by clamping-bolts 29, also of usual construction. The turret is fitted and adapted to rotate upon

the bolt 30, which is provided at its lower end with a head 31, having a pin 31^a entering into the slide, whereby the bolt is rigidly held therein. At a position directly above the turret the bolt 30 is provided with a washer and nut 32, whereby the turret is held in a position to permit of an easy and free rotary movement. Located above the turret and concentrical therewith is the turret-cap 33, which in its preferred construction has the lower and inner sides thereof beveled, as at 34, engaging the correspondingly-beveled upper surface of the turret 27. Fitted to the bolt 30 is the sleeve 35, provided at the upper part with a threaded portion 36, which is engaged by the correspondingly-threaded gear 37. The sleeve 35 is capable of a slight axial up-and-down movement by means of the spline and the key 38, but is held against rotation by means of that key in such a manner that any partial rotation of the gear 37 will impart a vertical longitudinal motion to the sleeve. In the drawings the gear 37 and the cap 33 are provided with ball-races 39 and 40, respectively, between which a series of balls is placed to reduce the friction between the gear and the cap. Placed above the sleeve 35 and threaded to the bolt 30 is the nut 41, which takes the thrust of the sleeve 35 when the gear 37 is rotated in the direction for forcing the cap 33 down upon the turret 27. The bolt 30 is preferably squared above the nut 41, as at 42, and receives the yoke 43, which is held in position by the nut 44, the purpose of which I will describe later. The spring 45 tends to press the sleeve 35, with its corresponding gear 37, into the upper position when that gear is turned in a direction to release the cap from the turret.

Placed rearward of the turret and rigidly secured on the slide in a central position is the bracket 48, having an upwardly-projecting hook-shaped portion 48^a, which serves as a guide, the object of which will be explained later, and this bracket is provided with the pivot 49, having fastened thereto on each side the arms 50 and 51, the lower projecting ends of which form shifters 52 and 53, which are adapted to engage the dogs 54 and 55, pivoted on pins 56 and 57, respectively. The dogs 54 and 55 are held in their normal position by weighted ends 58 and 59 or by any other equivalent mechanism. The dog 54 is permitted to yield when the slide is on its rearward movement, so that the shifter end 52 passes over the same; but the shifter end is caused to engage that dog when the slide is on its forward stroke, thereby effecting a movement of the connecting-rod 63 in the direction of the turret. The arrangement of the shifter 53 and dog 55 is such that the operation thereby is reversed—that is, the dog 55 yields when the slide is on its forward movement, but the shifter 53 engages the dog 55 on its rearward movement, thereby effecting a movement of the connecting-rod 63 away from the turret. The arm 51 is provided with a handle 60, which may be operated at will by the operator when he wishes to throw the shifter in any direction.

The arm 50 in its preferred construction is in the shape of an open jaw engaging a roller 61, pivoted on a pin 62, held in a downwardly-projecting portion of the connecting-rod 63. To hold the connecting-rod 63 in its proper alinement, I have provided the same with a slot 64, through which a pin 65 passes and is rigidly supported in the hook-shaped projection 48^a of the bracket 48. At the forward or turret end the connecting-rod is provided with a rack 66, which engages the gear 37 and rests on the top of the turret-cap 33 and is held in proper engagement by the yoke 43, previously described. By this means the connecting-rod is caused to be reciprocated by the shifter-stops 52 and 53, engaging their respective dogs 54 and 55, before the slide reaches its rearward limit of movement and also directly after the slide is caused to be forced forward.

I will now describe the mechanism whereby the locking-bolt is securely held in the turret during the time the tools are in operation upon the work.

For sake of clearness I have omitted in Figs. 1, 2, and 3 the mechanism whereby the turret is rotated, but being of usual construction I have shown one form of design in Figs. 16 and 18 and will refer for the time being to those figures.

The turret 27 is provided at its lower end with a recess formed therein and having a flange 70 fitted thereto, this flange being preferably made of a separate piece and generally of steel and is secured to the lower part of the turret by any convenient means. The outer end of the flange 70 closely fits a recess in the slide 22, as shown in Fig. 18. In the flange 70 a series of tapering sockets is formed equal to the number of tools held in the turret—in this case four in number—and which are engaged by the locking-bolt 105. Referring again to Figs. 1, 2, 7, and 8, the locking-bolt 71 consists of a bar the tapering ends of which, 72, are adapted to engage the sockets of the flange 70, and that locking-bolt is also provided with a downwardly-projecting pin 73, by which it is drawn out of engagement with the turret, and it is also provided with a projection 74, whereby the locking-bolt is held rigidly in its engaging position with the turret, as will be described hereinafter.

The mechanism for disengaging the locking-bolt from the turret will now be described, and consists of the lever 75, pivoted by the pivot 76 in the block 21. The spring 77 tends to keep the lever 75 in its normal engagement against the block, and as the slide is reciprocated on its longitudinal rearward movement the locking-bolt pin 73 engages the inclined surface 78, and the bolt is thereby withdrawn from the turret by the well-known operation.

The locking-bolt is also provided on its rear end with a socket 71ª, adapted to receive a spring 71ᵇ, which may be adjusted by the screw 71ᶜ; but I wish to state that the spring in this case only acts to throw the bolt quickly into the socket of the turret-flange when the pin 73 rides off from the lever 75; but the holding of the locking-bolt rigidly in the socket is effected by the movable and adjustable stop 84, which will be described later.

Extending rearward and directly back of the turret the slide 22 is provided with the apron 22ª, into which is rigidly fastened the pivot 79, upon which is pivotally held the auxiliary-slide actuator 80. (Best shown in Figs. 12 and 13.) A projecting bifurcated arm 80ª of the auxiliary-slide actuator engages the pin 81, secured in the auxiliary slide 82, which is provided with slideways 83, fitting into guideways of the apron 22ª. In the auxiliary slide 82 is fitted a stop 84, which in its preferred construction is shown in Figs. 9, 10, and 11 as being placed in an angular position to the center line of the auxiliary slide 82. Screws 85, fitted into the auxiliary slide 83, serve to hold the stop 84 in its relative position to the pin. 81. A slight movement of the screws 85 in either direction will increase or decrease the distance 86, which will again exert more or less pressure on the projection 74 of the locking-bolt 71 when that stop 84 is brought in axial alinement with the locking-bolt 71. The auxiliary-slide actuator 80 is also provided with shifter ends 80ᵇ and 80ᶜ, the same being in different planes, one above the other, as clearly shown in Fig. 13. These shifter ends 80ᵇ and 80ᶜ are brought in operative engagement with the dogs 87 and 88, as will now be described.

Mounted on the rear end of the block 21 are the dogs 87 and 88, pivoted on pivots 87ª and 88ª and held in the normal position by springs 87ᵇ and 88ᵇ, respectively. The dogs 87 and 88 are each permitted to yield in one direction when in engagement with their respective shifter ends and when the slide moves in a certain direction in such a manner that the dog 87 is permitted to yield when the shifter end 80ᵇ engages the same on its forward stroke, but causes the lever to take the position shown in Fig. 1 when the slide is on its rearward stroke, thereby withdrawing the stop 84 from engagement with the bolt. The dog 88 is permitted to yield when the shifter end 80ᶜ is on its rearward stroke, but is caused to engage with the dog 88 as soon as the slide begins to go forward, thereby thrusting the stop 84 back of the locking-bolt and pressing the same rigidly into the socket of the turret.

It is not essential in my invention what form of turret-rotating mechanism is employed; but I will briefly describe the means whereby the rotation of the turret is effected, and I have illustrated the same in Figs. 16, 17, 18, and 19.

Projecting from the lower side of the turret 91 are pins 90, corresponding in number with the number of tools in the turret and which are adapted to engage the hook-shaped projection 92 of the lever 93, located below the plane of the pins 90. The lever 93 is pivoted on the pivot 94, which is borne by the block 95, provided with the rearwardly-projecting rod 96 and the forwardly-projecting shouldered rod 97. Coiled around a portion of this rod is a spring 98, resting on one side against a shoulder of the rod 97 and engaging on the other side the set-screw 99, and whereby the tension of the spring may be adjusted. The rearward end of the turret-slide 100 is recessed, as at 101, permitting the stationary pin 102, which is rigidly secured in the block 103, to project into the recess 101, and with this pin the rod 96 is adapted to engage. As the slide continues to be forced backward the rods 96 and 97, with the block 95, are arrested, and the hook 92 engages one of the pins 90 and the turret is caused to be rotated. A spring 104 in the block 95 tends to keep the lever 93 in the position shown in Fig. 16, and as the slide is forced forward the projection 92 engages the pin 90, thereby rotating the turret, all of which is of well-known construction.

The means for locking the turret in this form of construction comprises a reciprocating locking-bolt 105, located in a longitudinal recess in the upper part of the turret-slide 100, with its tapering end adapted to engage the sockets 106 of the turret, and the locking-bolt 105 is also provided with the upwardly-extending projection 74′. On the rear end of the locking-bolt is a recess adapted to be engaged by the trip-pawl 107, pivotally mounted on the pin 108 in the slide 100. The lower end of the trip-pawl 107 is adapted to engage the stationary trip-block 109, securely held in a recess of the block 103 and fastened by the set-screw 110. A light spring 111, acting upon the plunger 112, engages the trip-pawl 107 at its upper end, whereby the trip-pawl is held at all times in its proper recess in the locking-bolt. Back of the locking-bolt 105 and pressing directly upon the same is the spring 113, which forces the locking-bolt into the socket as the turret-slide is forced forward and as soon as the lower end of the trip-pawl is released from the block 109. The locking-bolt is securely and rigidly held in the socket of the turret as follows: Immediately above the slide and laterally grooved in the same is a cover 115, which supports the laterally-moving auxiliary slide 116, substantially of the same construction as that previously described and as represented in Figs. 9, 10, and 11. The auxiliary slide 116 is provided with the stop set-screw 117 and its actuating-pin 118, which is engaged by the bifurcated projection of the actuator 80′ and is provided with the shifter ends 80ᵇ and 80ᶜ, the latter being placed in different planes from one another and engaging dogs of the exact construction previously described. The stop set-

screw 117 is represented as an ordinary set-screw instead of the angular sliding stop, as represented in Fig. 9.

In Figs. 14 and 15 I have shown a modified form of the mechanism which actuates upon the turret-clamping mechanism, and the same principally consists in placing the dogs 54^a and 55^a within easy reach of the operator outside on the front and back of the slide-block 21, thereby necessitating the shifters 52^a and 53^a to be bent outward, adapting them to engage the dogs, as previously described.

From the foregoing description the operation of the machine is apparent, and therefore I will only give a brief description of the combined movement of the turret-clamping mechanism and locking-bolt-holding device.

The slide, which is adapted for reciprocatory motion by any convenient means which form no part of my invention, I will assume as being in its rearward position, as shown in Figs. 1 and 2, and as the same is caused to be moved forward the shifter end 52 engages the dog 54, thereby effectively thrusting the connecting-rod forward, whereby the gear 37 is caused to rotate, drawing the sleeve 35 against the nut 41, whereby the cap 33 is forced down upon the turret 27 and rigidly secures the same to the slide, and as the slide continues to move forward the shifter end 53 rides over the yielding dog 55. Simultaneously the shifter end 80^c engages the dog 88 and forces the auxiliary slide 82, with its stop 84, forward, bringing the stop behind the projection 74 of the locking-bolt 71 and rigidly securing the same in the recess of the flange of the turret, and as the slide continues to move forward the shifter end 80^b rides over the yielding dog 87, as clearly shown in Fig. 6, and the tool of the turret is then brought to bear upon the work. When the tool has completed its work, the slide is forced backward and the shifter end 80^b engages the dog 87, thereby withdrawing the auxiliary slide, with its projection 84, from the projection 74 of the locking-bolt 71, and as the slide continues to be forced backward the locking-bolt is withdrawn by the engagement of the pin 73 with the inclined surface 78 of the lever 75, thereby releasing the turret, and as the slide is continued to be forced still further backward the shifter end 80^c rides over the yielding dog 88 and simultaneously the shifter end 53 engages the dog 55, thereby causing the connecting-rod 63 to retract and the gear 37 to turn, whereby the sleeve 35 is released, and the turret may be oscillated a quarter of a revolution by the engagement of the projection 92 with the pin 90, whereby the turret is rotated, presenting a new tool in alinement with the work.

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

1. In a machine of the class specified, in combination, the reciprocating slide, the turret, the locking-bolt borne in the slide, the rigid stop 84 adapted to engage and rest on the locking-bolt during the reciprocation of the slide and while the tools are in operation upon the work, and means for engaging and disengaging the stop from the locking-bolt at predetermined intervals substantially as described.

2. In a machine of the class specified, in combination, the reciprocating slide, the turret, the locking-bolt borne in the slide, means for effectively withdrawing the locking-bolt, the spring to return the same into the socket of the turret, and the solid stop to rigidly hold and press the locking-bolt in that position during the reciprocation of the slide and while the tools are in operation upon the work, substantially as described.

3. In a machine of the class specified, in combination, the reciprocating slide, the turret, the locking-bolt borne in the slide, means for effectively withdrawing the locking-bolt, the spring to return the same into the socket of the turret, the independent, rigid stop to effectively hold the bolt in operative engagement during the reciprocation of the slide, and while the tools are in operation upon the work, and means for engaging and disengaging the stop at predetermined intervals, substantially as described.

4. An attachment for screw-machines, in combination, the slide, the turret mounted on the slide, the locking-bolt carried in the slide and adapted to engage the turret, mechanism adapted to operate the locking-bolt, the auxiliary slide, the adjustable stop carried by the auxiliary slide, whereby the pressure of the stop upon the locking-bolt may be adjusted while the tools are in operation upon the work, and means for operating the auxiliary slide to engage and disengage the stop from the locking-bolt, substantially as described.

5. An attachment for screw-machines, in combination, the slide, the turret mounted on the slide, the locking-bolt carried in the slide and adapted to engage the turret, mechanism adapted to operate the locking-bolt, the auxiliary slide, the stop mounted in the auxiliary slide, and means whereby the stop may be adjusted to bear the greater or less pressure on the locking-bolt, substantially as set forth.

6. An attachment for turret-machines, in combination, the slide, the turret mounted thereon, automatic turret-clamping mechanism, whereby the turret is clamped at predetermined positions to the slide and independently from the turret-locking mechanism, consisting of the auxiliary slide having a rigid stop 84, substantially as described.

7. In a screw-machine, the combination of the slide, the turret mounted on the slide, the locking-bolt borne in the slide, the auxiliary slide mounted on the slide and provided with a stop, means for effectively moving the auxiliary slide at predetermined intervals, and means for automatically clamping the turret to the slide, substantially as described.

8. In a screw-machine, the combination of

the slide, the turret mounted on the slide, the locking-bolt borne in the slide, the auxiliary slide mounted on the slide and provided with a stop, means for effectively moving the auxiliary slide at predetermined intervals, the turret-clamping mechanism whereby the turret is clamped at predetermined positions to the slide and independently of the turret-locking mechanism, substantially as described.

9. In a screw-machine, the combination of the block, the slide, the turret, the bracket, the shifters 52 and 53, pivotally mounted in the bracket, the dogs 54 and 55, the connecting-rod, the gear, and the sleeve, all so combined and operating, substantially as described, that the turret is locked when the slide is moved forward, and released when the slide is moved backward.

Signed by me at Hartford, Connecticut, this 25th day of November, 1899.

JULIUS JETTER.

Witnesses:
CHARLES F. WEIDEMANN,
ED. E. CLAUSSEN.