No. 612,155. Patented Oct. 11, 1898.

L. H. BLOOD.

TURRET MECHANISM.

(Application filed Feb. 3, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

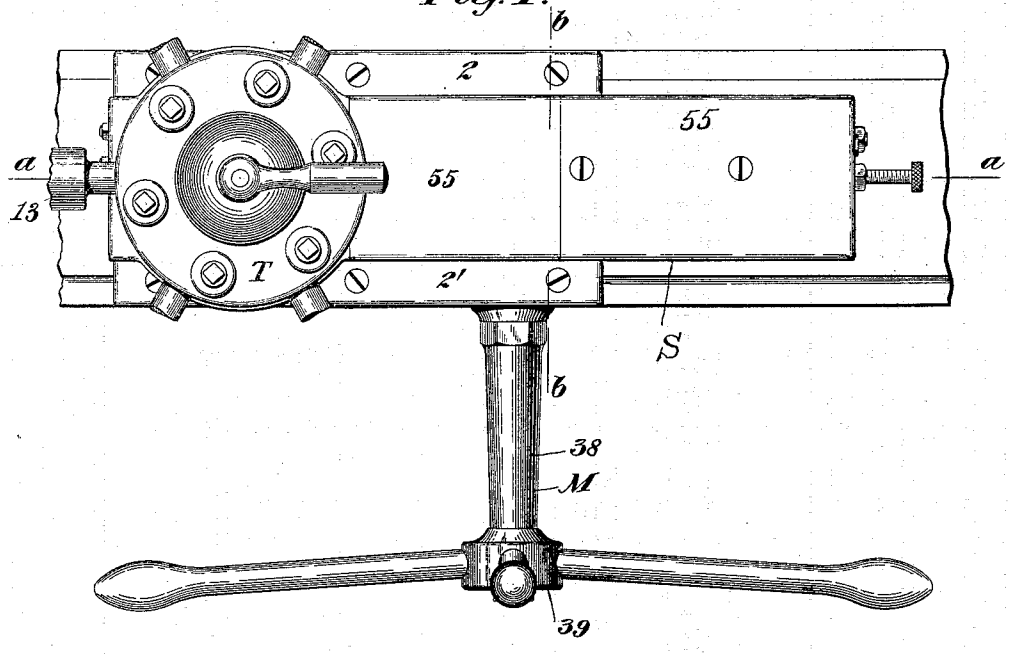


Fig. 2.

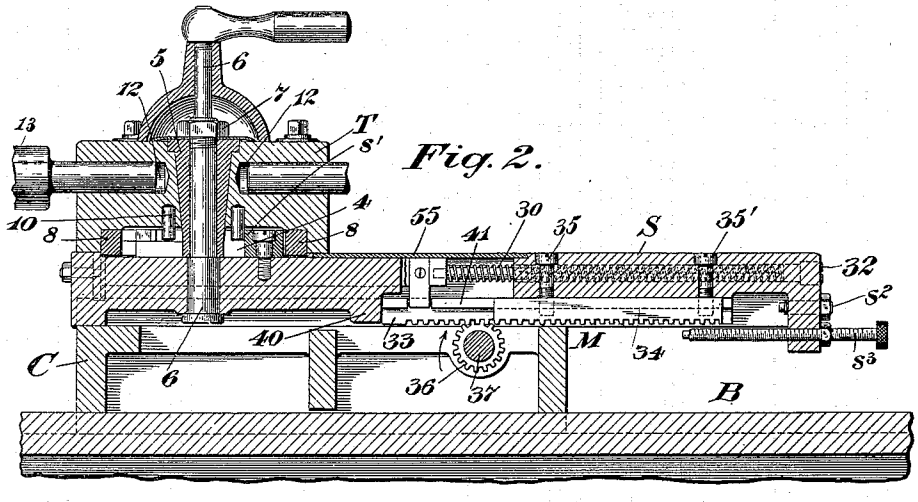
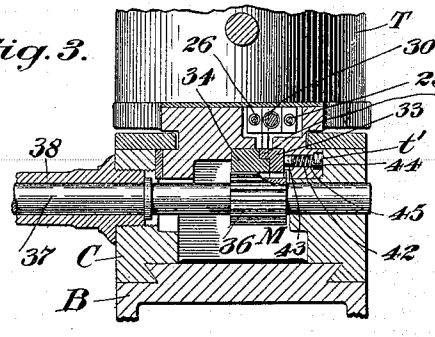


Fig. 3.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 4.

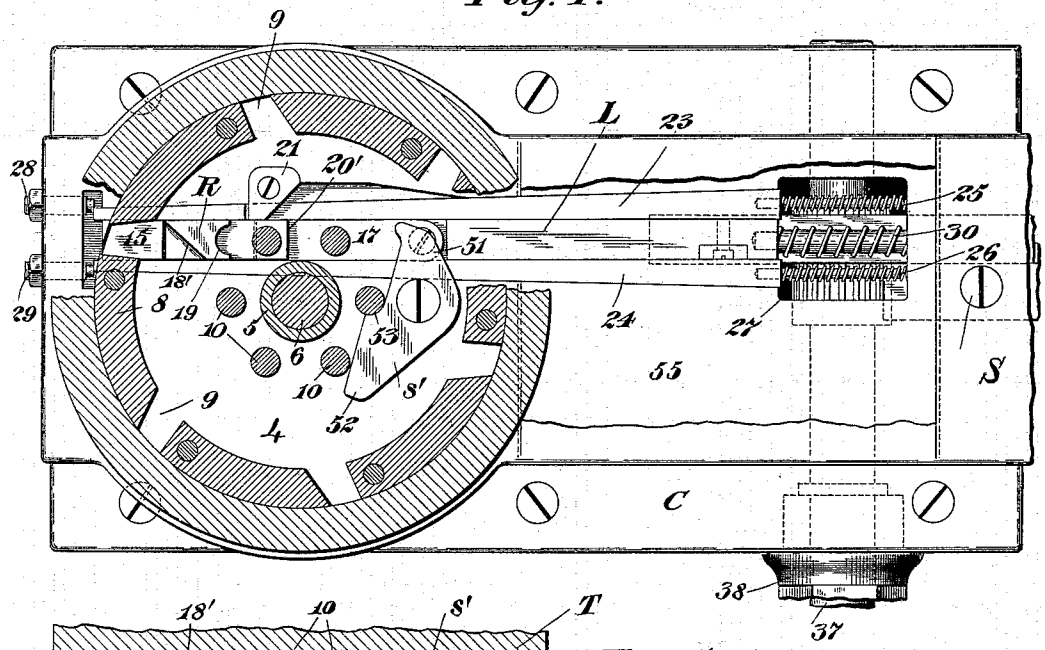


Fig. 5.

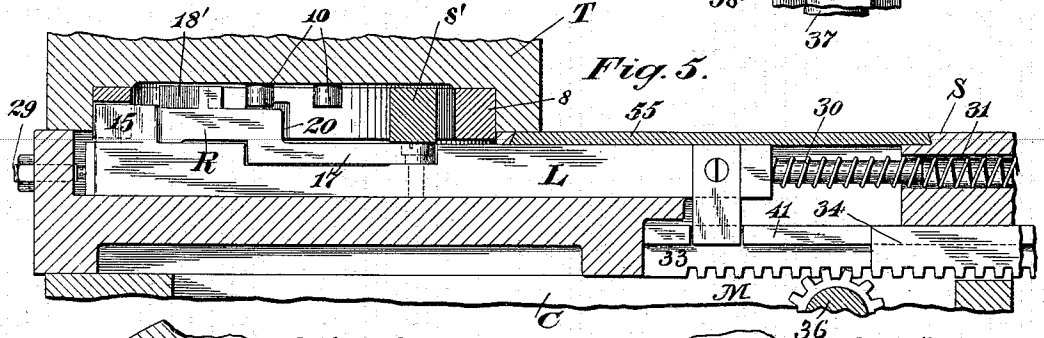


Fig. 6.

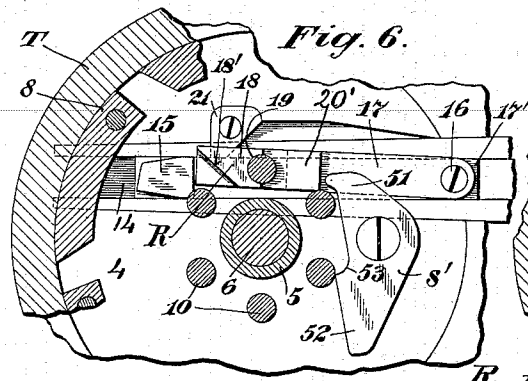


Fig. 7.

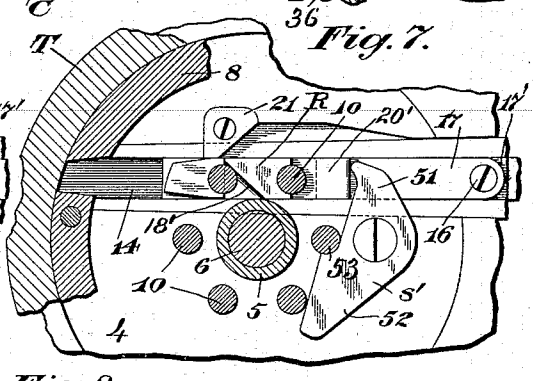
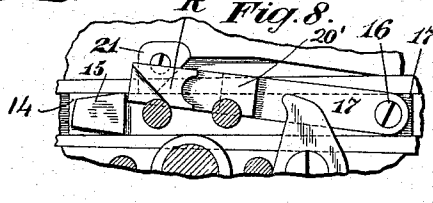


Fig. 8.



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UNITED STATES PATENT OFFICE.

LOUIS H. BLOOD, OF HARTFORD, CONNECTICUT.

TURRET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 612,155, dated October 11, 1898.

Application filed February 3, 1898. Serial No. 669,014. (No model.)

To all whom it may concern:

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

This invention relates to turret mechanisms of that class comprehending a turret-slide, a turret rotatably mounted on said slide and having a circuit of concentrically-disposed stop-faces, a turret-locking bolt supported for reciprocatory movement on the slide in position to successively engage successive stop-faces of the turret, a turret-rotating device carried by said bolt and effective at a predetermined point in one movement thereof for engaging a fixture on the turret, whereby to impart a rotative movement to said turret concurrent with one movement of the bolt, and means in connection with the bolt and slide and effective for imparting reciprocatory movements thereto, as described, for instance, in my concurrently-pending application, Serial No. 669,013, filed February 3, 1898; and the present invention relates more particularly to the actuating mechanism for the turret, slide, and turret-locking bolt.

One object of my present invention is to provide, in connection with a reciprocatory slide and a reciprocatory locking-bolt of a turret mechanism, a slide and bolt actuating device comprising two independently and unitarily shiftable racks, one of which is secured to the slide and the other of which is secured to the bolt, stop devices for controlling the independent movements of said racks, a pinion normally meshing with one of the said racks and effective at a predetermined point in the advancing movement of said rack for also meshing with the other rack to impart reciprocatory movements to the bolt and slide, one in advance of the other, and means for rotating said pinion.

In the drawings accompanying and forming part of this specification, Figure 1 is a plan view of a turret mechanism embodying my present improvements, said figure showing the turret, turret-slide, a portion of the turret-slide-supporting carriage, and a portion of the bed of an ordinary turret-lathe. Fig. 2 is a central vertical longitudinal section of the turret mechanism, taken on a line corresponding with the dotted line *a a*, Fig. 1. Fig. 3 is a vertical cross-section of the turret mechanism, taken on the dotted line *b b*, Fig. 1, portions of the actuating device being broken away. Fig. 4 is a horizontal section, on an enlarged scale, partially in plan view, of a portion of the turret mechanism illustrated in Figs. 1 and 2, said figure showing the turret-locking bolt in its fully-advanced or turret-locked position, parts of the turret and the face-plate, which cover certain elements, being broken away. Fig. 5 is a longitudinal section similar to Fig. 2, on an enlarged scale, of a portion of the turret mechanism, showing the parts in the positions thereof illustrated in Fig. 4. Figs. 6 and 7 are horizontal sectional views similar to Fig. 4 of a portion of the turret, turret locking- and rotating devices, and showing two successive retractive positions of the turret-locking bolt and turret-rotating pawl during one retractive movement of said bolt, and also showing two successive positions of the stop device which arrests successive rotative movements of the turret; and Fig. 8 is a similar sectional view of a portion of the parts shown in Figs. 6 and 7, illustrating the turret-locking bolt and turret-rotating pawl in the first stage of their advancing movements.

Similar characters designate like parts in all the figures of the drawings.

Inasmuch as the mechanism constituting my present invention is applicable in the form thereof illustrated in the drawings and in variously-modified forms thereof to machines of different characters, it is distinctly to be understood that the invention is not limited to the combination of the present turret mechanism with any particular kind of machine, nor is it limited to the particular construction and organization thereof illustrated in the accompanying drawings.

As an entirety the turret mechanism in the preferred construction and organization thereof illustrated in the accompanying drawings comprises a turret-slide, (designated by S,) which may be supported in any suitable manner on a carriage C, mounted, as usual, on the bed B of the supporting-frame of the

machine proper; a turret (designated in a general way by T) pivotally or rotatably supported on the turret-slide S and having a circuit of concentrically-disposed stop-faces or lock-notches; a turret-locking device L, supported for reciprocatory movement on the turret-slide at one side the axis of rotation of the turret and in position to successively engage the successive stop-faces of the turret on successive rotative movements of said turret; a reciprocatory turret-rotating device operable with the locking device for engaging fixtures on and for imparting rotative movements to the turret; an actuator (designated in a general way by M) coöperatively connecting the turret slide and locking device and embodying two racks, one of which is fixed to the turret-slide and the other of which is fixed to the locking device and the latter of which is capable of movement independent of the former, and a pinion for imparting reciprocatory movements to the racks.

In the form thereof illustrated in the accompanying drawings the turret-slide S, turret-supporting carriage C, bed B, turret T, turret-locking device L, turret-rotating device R, turret-stop device *s'*, and retarding instrumentalities in connection with said turret-locking device are shown of substantially the same general construction, organization, and operation as like parts in the application hereinbefore referred to and are for convenience designated in my present application by like characters.

The turret-slide, which may be of any suitable general construction adapted for supporting other elements of the turret mechanism, is shown of oblong construction and is supported between 2 and 2′ in a guideway on the carriage C.

The turret T, which may be of any suitable general construction, is shown having a tubular or recessed base portion 4, the recess being of a depth and a diameter sufficient for inclosing and facilitating the operation of certain parts hereinafter described. This turret is shown pivotally supported on the turret-slide by means of a conical sleeve 5, extending through a conical central bore in the turret and resting at its lower end upon the upper face of the slide, and a headed stud 6, extending through a vertical opening in the turret-slide and through the sleeve 5, said parts being clamped together by a nut 7, screwed upon a diametrically-reduced upper portion of the stud 6, this pivotal connection being shown of a construction common to supports of ordinary turrets.

Secured in the recess 4 of the turret is a stop-ring 8, having a series or circuit of equidistantly-disposed transverse stop-face-formative notches 9 formed in the lower face thereof, said stop-notches being shown as six in number and concentric to the axis of the turret.

As a means for facilitating rotative movements of the turret said turret is furnished with what may be termed a "ratchet" device, said ratchet device comprising in the form thereof shown in the accompanying drawings a series or circuit of six equidistantly-disposed ratchet teeth or pins 10, depending into the recessed portion 4 of the turret, said pins being concentrically disposed about the axis of said turret, with their lower faces in a horizontal plane somewhat above the horizontal plane of the upper walls of the stop-notches 9.

As in turrets of ordinary construction the turret illustrated in the accompanying drawings is shown having a series of radial tool-sockets 12 and tool-holding devices 13, which may be of any suitable character.

As a means for locking, unlocking, and imparting rotative movements to the turret I have provided in operative connection with the turret-slide a unitary turret locking, unlocking, and rotating device comprehending a reciprocatory turret-locking bolt or device, a reciprocatory turret-rotating pawl or device, and an actuator in operative connection with the turret-locking bolt.

In the preferred construction and organization thereof (illustrated most clearly in Figs. 2, 4, and 5 of the drawings) the turret locking, unlocking, and rotating device comprises a turret-locking bolt L, supported for reciprocatory movement in a guideway 14 in the turret-slide S, a turret-rotating pawl R, pivotally mounted on the bolt L, near the forward end thereof, and means, hereinafter described, for reciprocating the bolt. This turret-locking bolt is shown of oblong construction and has a wedge-shaped locking portion 15 at the extreme forward end thereof which projects upward above the upper face of the main portion of said bolt. This bolt is supported in the guideway 14 of the slide S at one side the axis of rotation of the turret and has the upper face of the main portion thereof flush, or substantially flush, with said turret-slide.

The turret-rotating pawl or device R is shown pivotally supported at 16 on the upper face of the turret-locking bolt within the recessed portion 4 of the turret and with its forward end slightly in the rear of the locking portion 15 of said bolt, said pawl being shown of a width substantially equal to the width of said bolt and being normally disposed with its side face flush with the side face of the bolt. This pawl comprises a main body portion 17, seated in a recessed portion 17′ of the bolt, with its upper face preferably flush with the upper face of said bolt, and has an upwardly-extending ratchet-tooth-engaging portion 18, the forward side face of which is inclined, as shown at 18′, and serves to effect a transverse movement of the pawl when the forward end of said pawl strikes a ratchet-tooth during the advancing movement of the bolt L to thereby cause the same on its return movement to readily pass by said ratchet-tooth.

In the form thereof shown in the accom-

panying drawings the ratchet tooth or pin engaging face 19 of the pawl is shown concaved to correspond to the contour of the ratchet-tooth and is of sufficient length as to extend substantially around one-half the circumference of said tooth. This pawl is also furnished at the under side, near the forward end thereof, with an offset portion or abutment 20, and the turret-slide is shown furnished with a stop or projection 21, disposed in position to engage the offset portion or abutment 20 of said pawl during the advancing movement of the bolt and when the pawl is in the position illustrated in Fig. 8 of the drawings, said projection 21 serving to return the pawl after the same has passed a ratchet-tooth to the tooth-engaging position thereof. (Shown in Fig. 4.)

For the purpose of guiding the turret-locking bolt L and for retarding the retractive unlocking movement of said bolt the guideway 14 of the turret-slide is shown tapered, the forward end being of less width than the rearward end thereof, and the bolt L is supported between adjacent parallel faces of two tapered retarding devices or guides 23 and 24, interposed between the outer faces of said bolt and the opposite tapered faces of the guideway, said guides being held in frictional engagement with the opposite faces of the bolt, preferably by means of spiral springs 25 and 26, interposed between inner ends of said guides and a portion of the slide S, the slide being recessed at 27 to receive said springs, as shown most clearly in Fig. 4 of the drawings. These springs force the guides 23 and 24 forward and inward and into tight engagement with the opposite faces of the lock-bolt, the advancing and transverse movements of the guides being preferably limited and the frictional stress of said guides being regulated by stop-abutments 28 and 29, (shown as screw-bolts,) extending through the forward end of the slide S and bearing at their inner ends against the forward ends of the guides 23 and 24, respectively.

In connection with the sliding bolt L, I have provided a resistance or reactionary device which in the form thereof shown in the accompanying drawings is in the nature of a spiral spring 30, seated in a horizontal recess 31 in the slide S and bearing at the forward end thereof against the rear end of the bolt and at the opposite end thereof against an adjustable tension device 32, (shown as a screw-bolt,) extending into the rear end of the recess 31 at the extreme rear end of the slide S.

As a means for imparting reciprocatory movements to the turret-locking bolt and turret-supporting slide independently and unitarily, as required for first effecting an advancing movement of the bolt to lock the turret, then effecting advancing and retracting movements of the slide and bolt unitarily, and then effecting a further retractive movement of the bolt independently of the slide to unlock the turret, I have provided an improved bolt and slide actuating device which in the preferred construction and organization thereof illustrated in the accompanying drawings comprises two horizontally-disposed racks 33 and 34, set side by side, with their teeth in substantial alinement and one of which racks, as 33, is fixedly secured to the turret-locking bolt L and is supported for reciprocatory movement below the lower face of the slide S, and the other of which, as 34, is fixedly secured to the lower face of the slide S, preferably by screws 35 and 35′, a rack-actuating pinion 36, fixed to the shaft 37, journaled at one end in a bearing on the carriage C and having its opposite end extending through an elongated bearing 38, fixed to the side wall of said carriage, and means (shown as a pilot-wheel 39) fixed to the outer end of the shaft 37 and adapted for rotating the shaft and pinion. This pinion 36 is shown as an elongated or barrel pinion and is disposed in position to mesh with the teeth of first one and then both of said racks.

The bolt-actuating rack 33 is shown of somewhat greater length than the slide-actuating rack 34, and the two racks 33 and 34 will be so disposed relatively to each other and relatively to the pinion 36 that when the turret-locking bolt is in its locked position and the slide S is in its fully-advanced position the pinion 36 will mesh with both racks and a rotative movement imparted to the shaft 37 through the medium of the pilot-wheel 39 in the direction of the arrow in Fig. 2 will first retract the slide and all parts carried thereby in unison, and when the slide has arrived at the fully-retracted position (shown in Fig. 2) a continued rotative movement of the pinion 36 in the direction of said arrow will impart a retractive movement to the rack 33 and bolt connected with said rack independent of the rack 34 and connected slide, the pinion 36 at this time only meshing with one of the racks, as 33. Therefore it will be seen that on a reverse rotation of the pinion 36 when the bolt is in its fully-retracted position and the slide S is in the position shown in Fig. 2 said pinion will first operate to advance the rack and shift the bolt into locked engagement with the turret and will then advance the rack 34, slide, and turret unitarily, the forward end of the rack 33 abutting against a projection or stop-abutment 40 on the slide when the bolt is in its fully-advanced or turret-locking position, this abutment limiting the independent advancing movement of the rack 33 and bolt L.

For the purpose of limiting the retractive movement of said bolt L, I have provided in connection with the slide S a stop device s^2, (shown as a screw-bolt,) having a screw-threaded bearing in a depending flange at the rear end of the turret-slide and having its inner end in position for engaging the rear end of the rack 33 and constituting a stop-abutment for said rack when the rack arrives at

its fully-retracted position, and as a means for limiting the advancing movement of the slide I have provided a stop device s^3, which is in the nature of a screw-bolt having a screw-threaded bearing in the flange at the rear end of the slide and having its forward end in position to abut against a fixture on the carriage C, as will be readily understood by reference to Fig. 2 of the drawings.

The rack 33, which is fixed at its forward end, preferably by means of a strap, to the rear end of the bolt L, the slide being recessed to facilitate the reciprocatory movement of said strap, has at the upper edge, on one side thereof, an elongated tenon or flange 41, supported in a mortise on the upper adjacent side of the rack 34, said rack 34 supporting the rear end of said rack 33.

As a means for retarding the movement of one rack relatively to the other I have provided a friction device t', supported in a transverse recess 42 in the slide S and bearing at its inner end against the side face of one of the racks, as 33. This friction device is shown comprising a brake-shoe 43, bearing at its inner face against the side face of the rack 33, an adjusting-screw 44, having a screw-threaded bearing in the outer end of the recess 42, and a spiral spring 45, interposed between the brake-shoe and the adjusting device. This device t' will obviously prevent accidental disalinement of the teeth of the two racks due to the vibration of the machine or other extraneous causes.

For the purpose of interrupting successive intermittent rotative movements of the turret and holding the same against accidental movement when the bolt is out of locked engagement with said turret, and also positively limiting the retractive movement of the bolt, I have provided in operative relation with the turret, bolt, and slide a stop device which, in the preferred form thereof (shown in Figs. 4, 6, and 7 of the drawings) is in the nature of a dog or lever s', fulcrumed on the slide within the recess 4 of the turret and having one arm, 51, thereof disposed in the path of movement of an abutment-face 20′ of the pawl R and having on the other arm, 52, a stop-face 53, shiftable when the abutment-face 20′ of the pawl strikes the arm 51 on the retractive movement of the bolt into engagement with one of the ratchet teeth or pins 10 of the turret, thereby arresting the rotative movement of the turret and simultaneously arresting the retractive movement of the bolt.

For the purpose of protecting the guideway 14 of the turret-slide against entrance of dust, &c., I have provided a face-plate 55, which covers the rearward portions of the turret-locking bolt, guide-blocks, and the recess 27 in the turret-slide.

The spring 30, which bears at its forward end against the rear end of the turret-locking bolt and at its rear end against the tension-adjusting device, serves not only to retard the retractive movement of the bolt, but will in practice constitute a bolt-advancing device, rendering said bolt, in the true sense of the term, "reactionary," so that when the turret-slide has been returned to its normal retractive position and the turret-locking bolt has been withdrawn from locked engagement with the turret through the medium of the pinion 36, which at the same time effects, through the medium of the pawl R, a rotative movement of the turret to bring its next succeeding lock-notch into registration with the bolt, the bolt will, on the release of the lever 33, be shifted by the spring 30 into locked engagement with the turret, as will be readily understood by reference to Figs. 2 and 5 of the drawings.

Having described my invention, I claim—

1. The combination, with a rotatable turret, of a turret-supporting slide and a turret-locking bolt supported for independent and also unitary reciprocatory movements; an actuating device in connection therewith and comprising two racks one of which is secured to the turret-slide and the other of which is secured to the bolt; and a pinion disposed to mesh with, and first impart independent movement to, one, and then a unitary movement to both, of the racks.

2. The combination, with a turret-slide and a support therefor, of a turret rotatably mounted on said slide and having a series of stop-faces; a turret-locking bolt supported for reciprocatory movements on said slide and in position to engage the successive stop-faces of the turret upon successive rotative movements thereof; two racks fixed one to the turret-slide and one to the locking-bolt, and disposed side by side with their teeth in substantial horizontal alinement; and a pinion disposed to mesh with one and then with both of said racks, whereby, on a rotative movement thereof, a reciprocatory movement will be imparted to first one and then both of said racks.

3. The combination, with a turret-slide and a turret-locking bolt supported, one by the other, for independent and also unitary reciprocatory movements, of two horizontally-disposed racks fixed one to the turret-slide and the other to the bolt; and a rack-actuating device embodying a pinion disposed to mesh with first one and then both of said racks, whereby an advancing movement will be first imparted to the bolt and then unitary advancing and retracting movements will be imparted to the slide and bolt, and a further retractive movement will be subsequently imparted to the bolt.

4. The combination, with a turret-slide and a support therefor, of a turret rotatably mounted on said slide and having a series of stop-faces; a turret-locking bolt supported for reciprocatory movements on said slide and in position to engage successive stop-faces of the turret upon successive rotative movements thereof; a turret-rotating device carried by said bolt; actuating mechanism in connec-

tion with the slide and bolt and comprehending two independently and unitarily shiftable racks one of which is carried by the slide and the other by the bolt; and a pinion disposed in position to mesh with first one and then both of said racks.

5. In a turret mechanism, the combination, with a reciprocatory turret-supporting device and a reciprocatory turret-locking device one of which is carried by the other, of two horizontally-disposed racks of different lengths; stops for limiting the independent movements of said racks; a rack-actuating pinion disposed to mesh with first one and then both of said racks; and means for rotating said pinion.

6. A turret mechanism comprehending a turret-slide; a rotatable turret having a circuit of equidistantly-disposed stop-faces and also having a circuit of equidistantly-disposed ratchet pins or projections; a turret-locking bolt supported for reciprocatory movements on said slide at one side the axis of rotation of the turret and in position to engage the successive stop-faces of said turret upon successive rotative movements thereof; a pawl shiftably mounted on the turret-locking bolt in position to engage a ratchet projection on the turret at each retractive movement of the bolt; two racks, one of which is secured to the slide and the other of which is secured to the bolt; a pinion disposed in position to mesh with first one and then both of said racks to impart first an independent reciprocatory movement to one rack and then a unitary reciprocatory movement to both racks; and means for rotating said pinion.

7. The combination, with a rotatable turret and its slide, of coöperatively-connected reciprocatory turret-locking and turret-rotating devices, the former of which has a turret-unlocking stroke in advance of the effective turret-rotating stroke of the latter; actuating mechanism comprehending two independently-shiftable racks, one of which is connected to the turret-locking device and the other of which is fixed to the slide; and a pinion disposed in position to mesh with, and advance, first, one rack independently, and then the two racks unitarily.

8. The combination, with a turret-slide, of a turret rotatably mounted on said slide and having a circuit of circumferentially-disposed stop-faces; a turret-locking bolt mounted on the slide at one side the axis of the turret and in position to engage the stop-notches successively; two horizontally-disposed racks set side by side, and one of which racks is fixed to the slide and the other of which is fixed to the bolt, and the latter of which racks is of greater length than, and projects beyond, the other; a rack-actuating pinion disposed in position to mesh first with one and then with both racks; and means for rotating the pinion.

9. The combination, with a rotatable turret and with a turret-slide and a turret-locking bolt, the latter of which is supported on the former, of two horizontally-disposed racks of different lengths, one of which is fixed to the slide and the other of which is fixed to the bolt and extends beyond the forward end of the former; stop-abutments for limiting the advancing and retracting movements of the bolt-actuating rack; a pinion disposed in position to mesh first with the bolt-actuating rack and then with the two racks, whereby, on a rotative movement of the pinion in one direction, an independent advancing movement will first be imparted to the bolt and then a unitary advancing movement will be imparted to the bolt and slide, and whereby, on the rotation of the pinion in the opposite direction, a unitary retractive movement will be imparted to the slide and bolt unitarily, and then an independent retractive movement will be imparted to the bolt; and means for rotating the pinion.

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