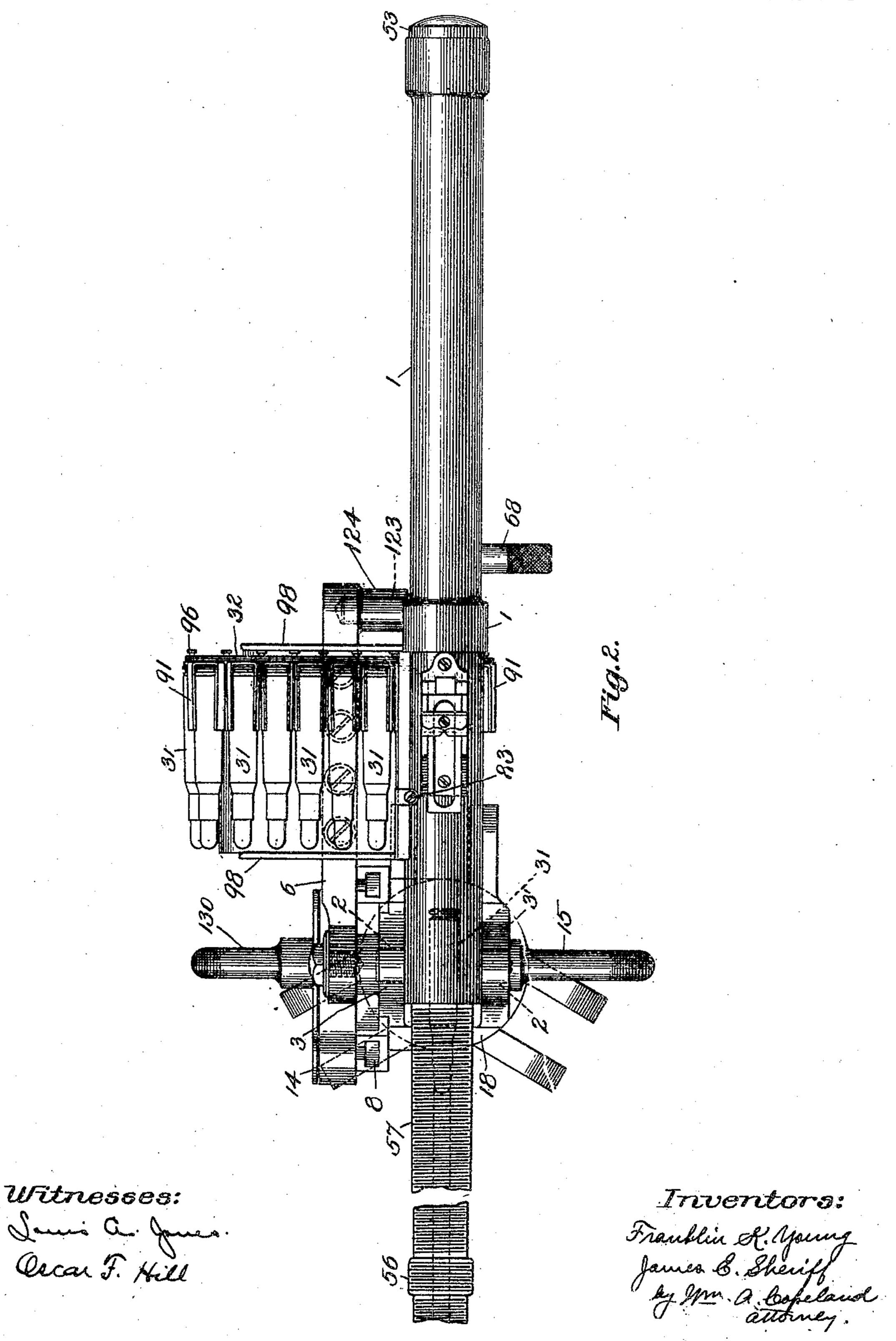
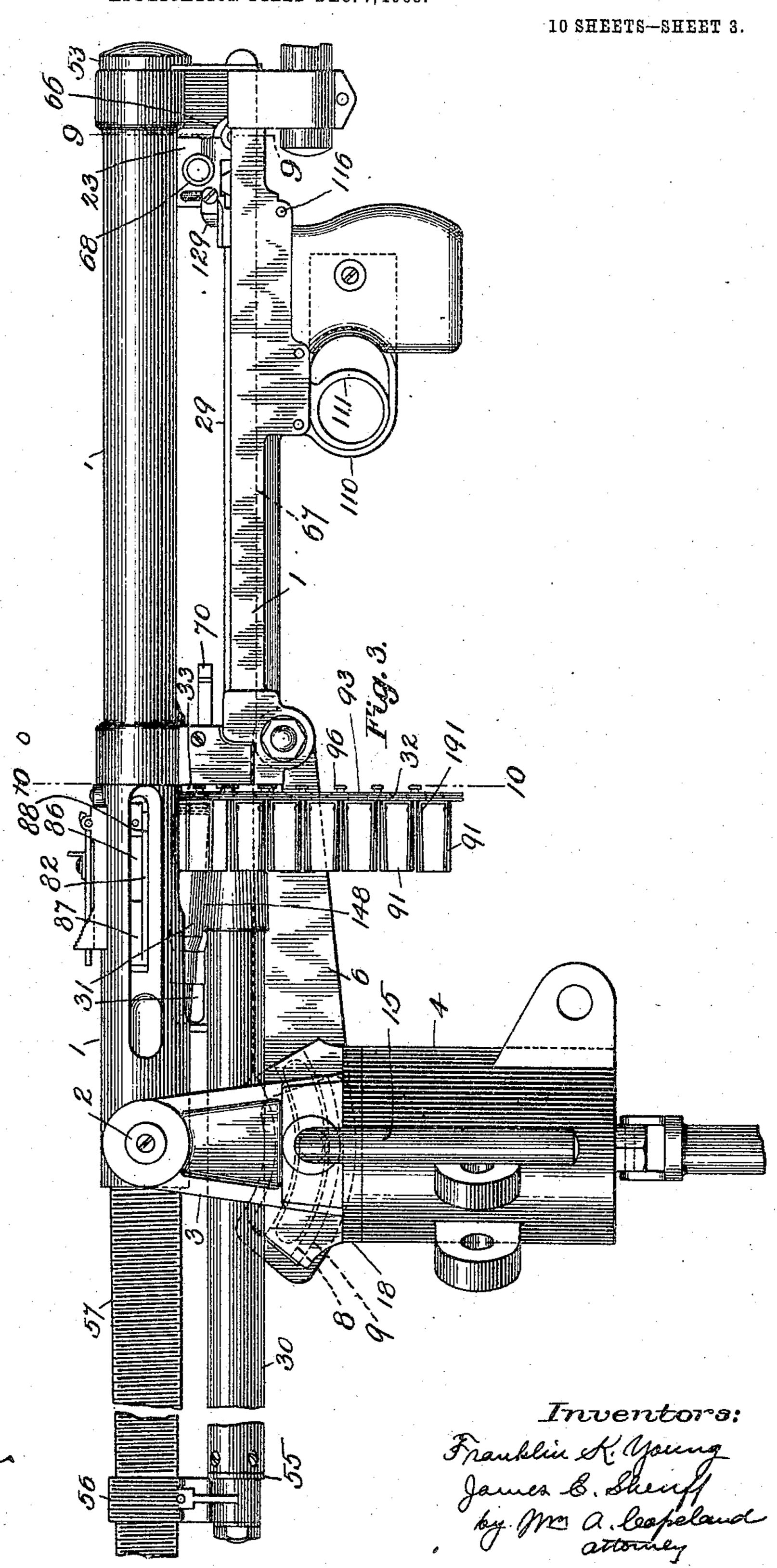
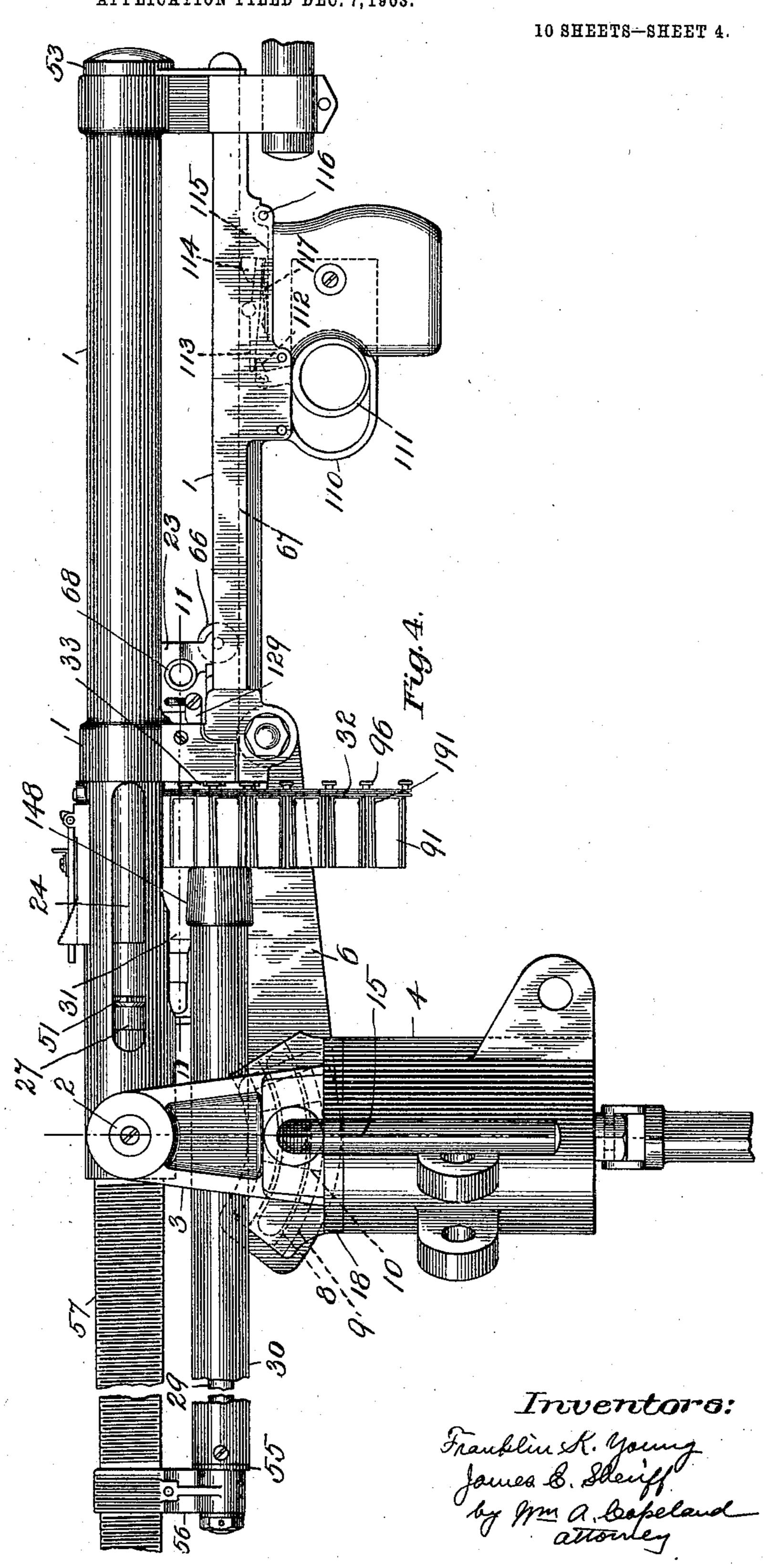


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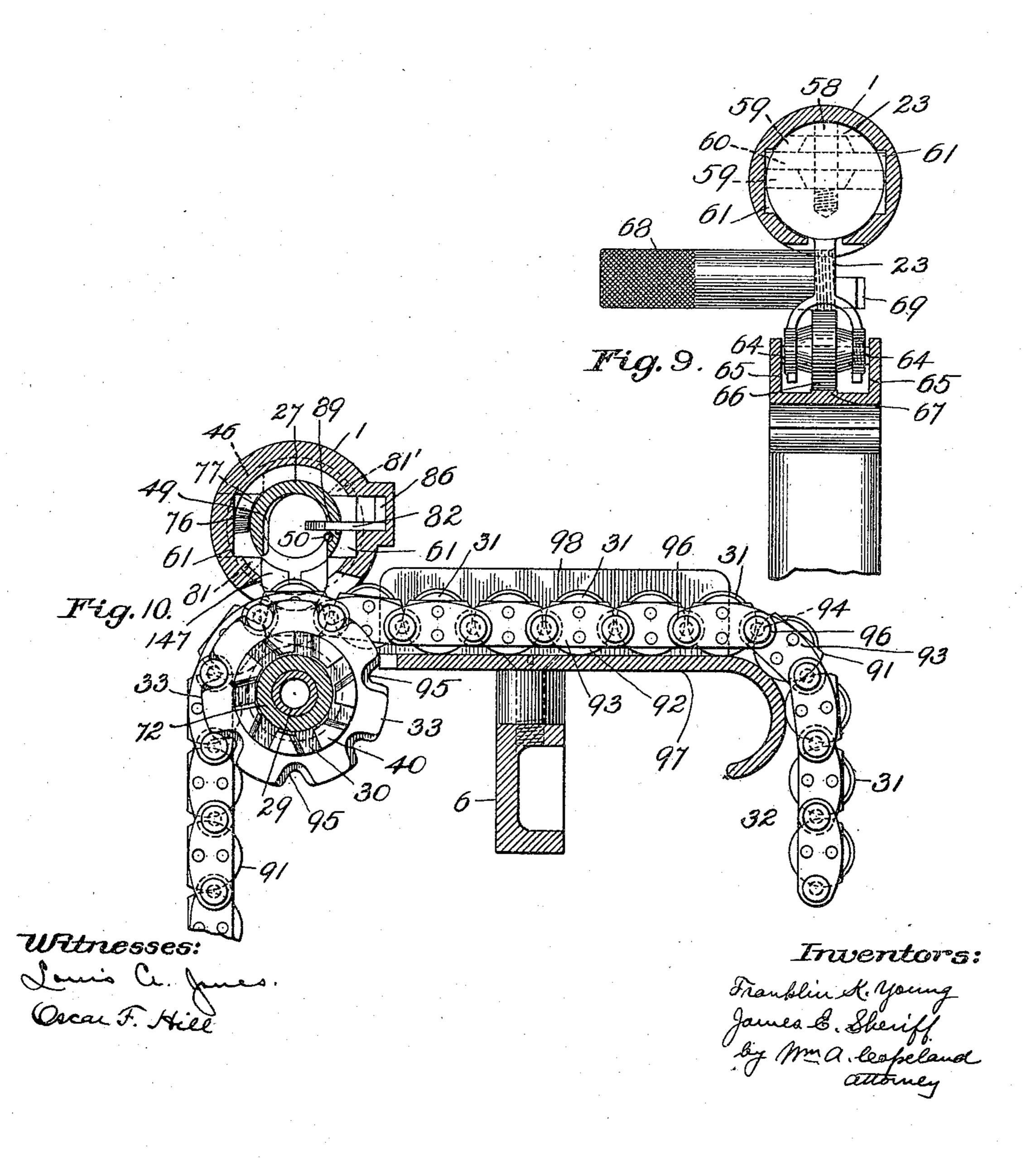
Witnesses: Semi a. Jones Oscar F. Hill

10 SHEETS—SHEET 5. Trovertors: Franklin K. young James & Sheriff Witnesses:

### F. K. YOUNG & J. E. SHERIFF. ORDNANCE AND FIREARM.

APPLICATION FILED DEC. 7, 1903. 10 SHEETS-SHEET 6. Franklik & young James & Sheriff by Mm a laspeland attorney

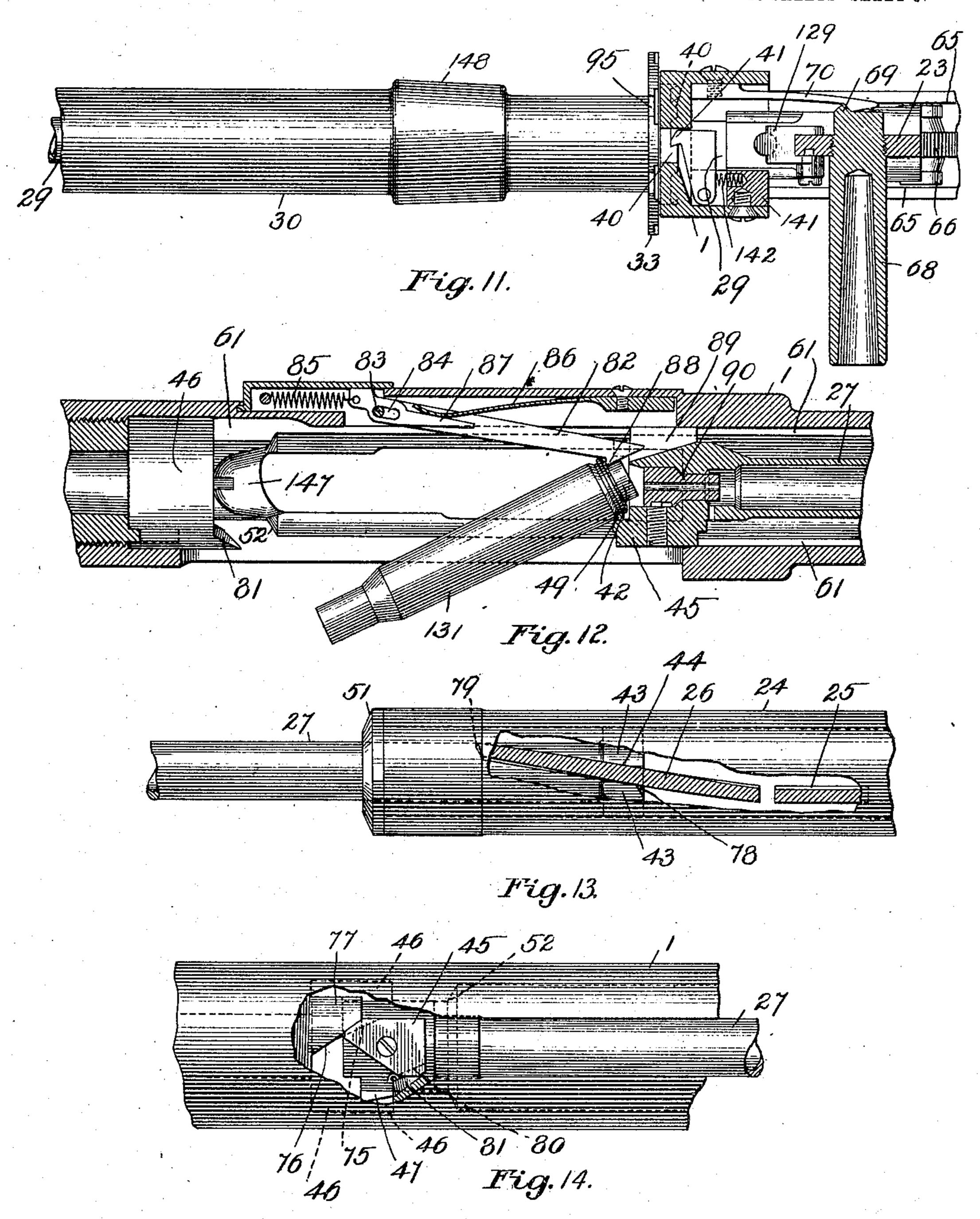
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#### F. K. YOUNG & J. E. SHERIFF. ORDNANCE AND FIREARM.

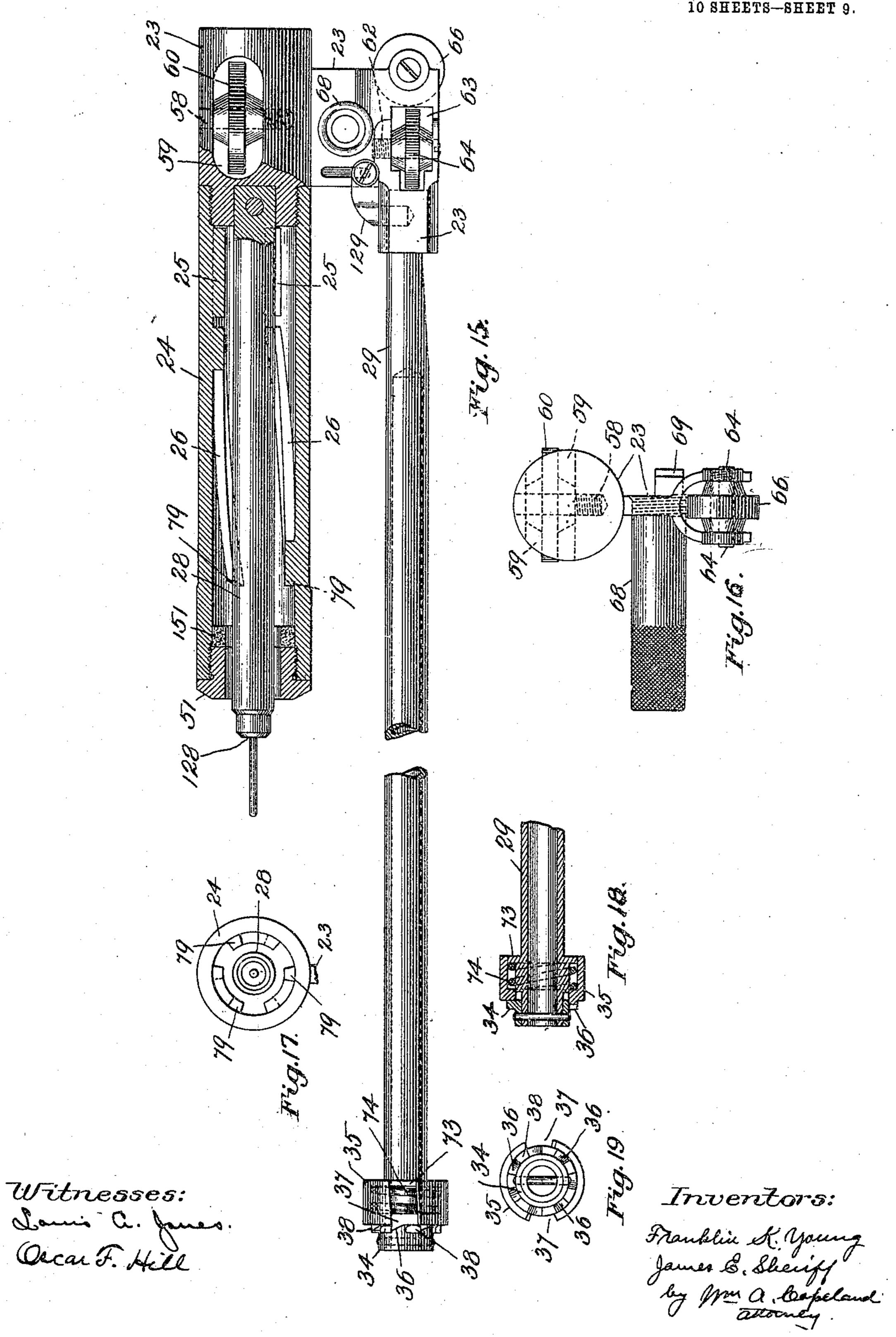
APPLICATION FILED DEC. 7, 1903.

10 SHEETS-SHEET 8.



Witnesses:

Inventors:



### F. K. YOUNG & J. E. SHERIFF. ORDNANCE AND FIREARM.

APPLICATION FILED DEC. 7, 1903.

10 SHEETS-SHEET 10. Fig. 20. Fig. H. Fig.23 Fig. 24 Fig. 25. Fig. 28. Fig.26. Fig.29. Fig.27.

Witnesses:

Inventors: Franklin K. Young James B. Sheriff

### United States Patent Office.

FRANKLIN K. YOUNG, OF BOSTON, MASSACHUSETTS, AND JAMES E. SHERIFF, OF NEW YORK, N. Y., ASSIGNORS TO AMERICAN AUTO-MATIC ARMS COMPANY, OF SACO, MAINE, A CORPORATION OF MAINE.

#### ORDNANCE AND FIREARM.

SPECIFICATION forming part of Letters Patent No. 794,652, dated July 11, 1905.

Application filed December 7, 1903. Serial No. 184,087.

To all whom it may concern:

Be it known that we, Franklin K. Young, of Boston, in the county of Suffolk and State of Massachusetts, and James E. Sheriff, of the borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Ordnance and Firearms, of which the following is a specification.

The invention has special reference to ordnance; but some of the features are applicable to firearms, and it is intended that the claims shall cover the invention in whatever form of apparatus it is embodied.

One of the objectionable features in automatic rapid-fire ordnance as usually constructed heretofore, especially in light-weight ordnance, has been the vibration of the barrel, which prevents accuracy of fire.

One of the objects of the present invention is to so construct rapid-fire ordnance as to reduce or entirely overcome the vibration. This is accomplished as follows: first, by so constructing the operating mechanism that the operating forceacts in alinement with the bore, and the breech mechanism itself acts in alinement with or parallel with the line of fire or has rotary movement of balanced parts concentric with the line of fire or concentric with a line parallel with the line of fire; second, by absorbing the rearward effect of the pressure from zero to maximum in a rearwardly-movable member, which is brought to rest gradually.

One feature of the invention relates to the means by which the bolt is given its primary rotary movement to unlock it from the weight in its forward automatic movement and is given its secondary rotary movement to lock to the weight in its rearward movement.

Another feature of the invention relates to means for preventing the rebound of the weight at the end of its forward movement until the explosion drives it rearwardly.

Another feature of the invention relates to the means by which the bolt is held locked

in the frame against either rotary or longitudinal movement at the end of its forward movement while the weight continues to move forward and during the preliminary rearward 50 movement of the weight.

Another feature of the invention relates to the form of the bolt.

Another feature relates to the form of the weight.

Another feature relates to the employment of a cushion surrounding the bolt and within the weight between engaging surfaces of the weight and bolt to form an elastic medium for the weight to impart rearward motion to 60 the bolt.

Another feature relates to the extractor. Another feature relates to the ejector.

Another feature relates to the means for feeding the cartridges.

Other features of the invention will be set forth in the specification and claims.

Referring now to the drawings, Figure 1 is a side elevation of a piece of ordnance and mount, the piece being in the position at the 7° instant of firing, after the firing-pin has been thrown into contact with the primer. Fig. 2 is a plan of Fig. 1, the tripod-legs of the mount being omitted. Fig. 3 is side elevation, enlarged from Fig. 1, partly broken away, 75 showing the piece in position ready for firing. Fig. 4 is a side elevation of the piece after the powder is ignited, before the moving parts have started rearwardly. Fig. 5 is a vertical longitudinal section showing the 80 automatic mechanism, except the forward end of the feed-cylinder, with a cartridge in position ready to be shoved into the chamber. Fig. 6 is a vertical longitudinal section after the collection of parts which form the weight 85 have been moved forward by the spring as far as they can go before the bolt begins to turn, the bolt and cartridge being pushed forward by the weight. Fig. 7 shows the weight advanced still farther forward than in 90 Fig. 6, so that the spirals in the spiral cylinder of the weight have completely traversed

the spiral-engaging lugs on the rear end of the bolt, the bolt being thus revolved into the completely-locked position, the cartridge being shoved full into the chamber. After the parts 5 are in the position shown in Fig. 7 the parts which form the weight move straight forward. Fig. 8 shows the parts at the end of the forward movement, the firing-pin being in contact with the primer. Fig. 9 is a vertical 10 cross-section on line 9 9, Fig. 3. Fig. 10 is a vertical cross-section on line 10 10 of Fig. 3. Fig. 11 is a detail plan section on line 11 11 of Fig. 4. Fig. 12 is a detail plan section illustrating the action of the ejector. Fig. 13 15 is a detail elevation of a portion of the spiral cylinder, broken away to show the spirals in engagement with the bolt. Fig. 14 is a detail side elevation of the frame, partly broken away, to show the spirals on the front end of 20 the bolt in engagement with the spirals on the frame and barrel. Fig. 15 is a detail side elevation, partly in section, of the parts which comprise the weight. Fig. 16 is a rear end elevation of Fig. 15. Fig. 17 is a front ele-25 vation of Fig. 15, partly broken away, and with the screw-threaded bushing in the end removed. Fig. 18 is a vertical longitudinal section of the left-hand portion of the lower part of Fig. 15. Fig. 19 is a front end ele-3° vation of Fig. 18. Fig. 20 is a detail plan of the bolt. Fig. 21 is a side elevation of the bolt. Fig. 22 is a front elevation of the bolt. Fig. 23 is a vertical longitudinal section of the bolt. Fig. 24 is a rear end elevation of 35 the bolt. Fig. 25 is a horizontal longitudinal section on line 25 25 of Fig. 21. Fig. 26 is a detail front elevation of the screw-threaded bushing in the forward end of the spiral cylinder of the weight. Fig. 27 is a side ele-4° vation of Fig. 26. Fig. 28 is a detail section on line 28 28 of Fig. 5. Fig. 29 is a detail section, through the spiral cylinder, of the weight and the spiral-engaging lugs on the rear end of the bolt and the three guides in 45 the rear end of the spiral cylinder.

The invention will now be fully described, and the novel features thereof will be particularly pointed out in the claims at the end of

the specification.

Referring now to the drawings, 1 represents the frame of the piece, and is mounted on trunnion-bearings 2, formed in the sides of the yoke 3, which is pivoted in the base 4, sup-

ported by the legs 5.

The breech mechanism includes a bolt which is both slidable and rotary, and a collection of parts which will be termed the "weight," which is slidable but substantially non-rotatable and actuates the bolt. Said weight is 60 actuated rearwardly by the explosion and has a preliminary rearward movement before it moves the bolt. It holds the bolt locked and has connections by which the continued rearward movement of the weight turns the bolt 65 and unlocks it and then moves the bolt rear-

ward. The bolt in its primary rearward movement is still further rotated by spiral connection with the frame, whereby the weight and bolt are locked together to prevent telescoping movement with relation to each other, 70 so that they then complete their rearward movement together as one piece. The weight in its rearward movement extracts the case and pulls it against the ejector. Then the weight is pulled forward, pushing another car- 75 tridge into the chamber and carrying the bolt as though one piece with it until the spiral connections on the bolt encounter a spiral connection on the barrel, which unlocks the bolt from the weight, the bolt having completed 80 its forward movement. Then the cam connections between the weight and bolt are brought into engagement with each other, whereby the bolt is further rotated and locked, and the weight telescopes still further onto 85 the locked bolt, holding the bolt locked and carrying the firing-pin against the primer, the firing-pin being a part of the weight.

The weight comprises, mainly, a cross-head 23, a bolt-actuating cylinder 24, secured to 90 said cross-head, having on the inner periphery straight ways 25 in the rear end and spiral ways 26 in the forward end, which engage the bolt 27, a firing-pin 28, whose rear end is fixed in the cross-head 23, and which extends cen- 95 trally through the said cylinder and the bolt, a mainspring-compressing rod 29, whose rear end is fixed in the lower part of said head 23 and which extends forwardly parallel with said cylinder 24 and through the mainspring- 100 case 30. Surrounding the rod 29 is the mainspring 71, the rear end of which abuts against a cylindrical projection 72 on the frame, which also forms a bearing for the rear end of the spring-case 30, the forward end of the 105 spring abutting against a shoulder 73 on the

rod 29.

The cartridges 31 are fed into the frame 1 by a chain conveyer 32, which runs over a sprocket-wheel 33 on the rearend of the spring-110 case 30. (See Figs. 2, 3, 4, 10, and 11.) Fast to the forward end of the mainspring-compressing rod 29 is a toothed hub 34, and mounted on said rod is a spring-pressed ratchet-sleeve 35, which is both rotatable and slidable, hav- 115 ing ratchet-teeth 36, which are held in alinement with the teeth 38 on said toothed hub by a spring 74, and having slots 37, which engage spirals 39 in the mainspring-case 30, to impart a rotary movement to the main- 120 spring-case during the rearward movement of said rod, thereby rotating the sprocket 33, which moves the cartridge-conveyer. (See Figs. 7, 8, 15, and 18.) On the rear end of the spring-case 30 are ratchet-teeth 40, which 125 are engaged by a pawl 41, pivoted in a block 141, fast in the frame, to prevent the sprocketwheel from rotating in the reverse direction from the feed during the forward movement of the ratchet-sleeve. (See Fig. 11.) Held 130

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in a socket in the block 141 is a spring 142, which presses against the rear side of the pawl to hold it in engagement with the ratchet 40.

The bolt 27 is made hollow to receive the 5 firing-pin 28 and the rear end of the piston 42 of the cartridge and the plunger 90. (See Figs. 8, 12, 23, and 25.) On the rear end of the bolt 27 are lugs 43, the spaces between which form grooves which engage the guide-10 ways 25 and 26 of the weight. The lugs are formed with spiral faces 44 to engage the spiral ways 26. (See Figs. 20, 21, 24, and 29.)

On the forward end of the bolt is an enlarged head carrying the locking-lugs 45 and 15 45', which engage recesses 46 in the frame to lock the bolt in the forward position to prevent being driven rearwardly by the explosion. (See Figs. 12, 14, 20, 21, 24, and 25.) Lug 45 is formed with a spiral face 75, which 20 on the forward movement of the weight and bolt engages a spiral face 76 on lug 77, which projects from the rear end of the barrel, and thereby gives the initial turning movement to the bolt to disengage the lugs 45 and 45' 25 from the guide-grooves 61 in the frame, and also to disengage the inclined faces 78 on the lugs 43 from the inclined faces 79 in the forward end of spirals 26, thus unlocking the bolt from the weight and bringing the spiral 3° faces of lugs 43 into engagement with the spirals 26. (See Figs. 12 and 14.) The face 79 being pressed against the face 78 and said faces being inclined they assist in the primary rotation of the bolt on the forward move-35 ment. The weight in its further forward movement further rotates the bolt through the medium of the spirals and turns the lugs 45 into the annular recesses 46 in the frame, thus locking the bolt to prevent rearward move-4º ment.

Lug 45 is formed with a spiral face 80 and lug 45' with a spiral face 80', which engage, respectively, with spiral faces 81 and 81' in the frame (see Figs. 6, 12, and 14) to give a 45 secondary rotary movement to the bolt to lock the bolt and weight together and prevent telescoping of the bolt and weight in the rearward movement of the weight after the bolt is unlocked from the frame. The primary 5° reverse rotary movement of the bolt, whereby it is unlocked from the frame, is accomplished by the spirals 26 retraversing the spiral faces on the lugs 43.

Hinged in the lower side of the forward end 55 of the bolt is a pawl 47, its forward end being pressed downward by a spring 48. (See Figs. 5, 6, 22, and 23.) During a part of the rearward movement of the bolt the said pawl trails over the upper side of the cartridge next to be fired, and near the end of its rearward movement the spring 48 snaps the pawl 47 down behind the cartridge, so that when the bolt is moved forward the pawl pushes the cartridge forward up the incline 147 in the frame into the chamber of the barrel.

On the forward end of the bolt is the extractor 49. (See Figs. 12, 22, and 25.) Carried in the head of the bolt on the opposite side from the extractor is a spring 50, which presses the rear end of the cartridge-case to-7c ward the extractor 49. (See Figs. 22 and 25.)

The bolt-actuating cylinder 24 and the firing-pin 28 are both secured to the cross-head 23 in a manner to prevent movement of either with relation to the cross-head. (See Fig. 15.) 75

In the forward end of the cylinder 24 is a split bushing 51, which at the end of the forward movement of the weight strikes against a shoulder 52 on the inside of the frame, which forms a stop for the weight. (See Figs. 80) 7, 13, 26, and 27.

Screwed into the rear end of the frame 1 is a hollow plug 53, in the open inner end of which is a pad 54, of suitable material, to form a cushion-stop for the weight in the end of its 85 rearward movement. (See Figs. 3 and 5.) Abutting against the rear end of the split bushing 51 is a cushion 151, which cushions the blow of the weight against the bolt in the rearward movement by bringing the cushion into 90 contact with the forward faces of the lugs 43. (See Figs. 5, 6, and 15.)

The rear end of the mainspring-compressing rod 29 is detachably secured in the crosshead 23, (see Figs. 5, 6, and 15,) and the rod 95 passes through a perforation in the frame into the mainspring-case 30. The means shown in the drawings for securing the rod 29 in the cross-head 23 is a vertically-movable catch 129. In the forward end of the mainspring-case 30 100 is a head 55, having its forward end reduced to form a journal which is supported in a hanger 56, hung on the barrel 57. (See Fig. 8.) Located in the journal of said head 55 is a spring 155, which extends rearwardly from 105 the journal and will engage the rod 29 of the weight before it reaches its most forward position and form a cushion for the weight.

Journaled on a vertical pivot 58 in a slot 59 in the upper part of the cross-head 23 is an 110 antifriction-roller 60, which is of sufficient diameter to extend through the sides of slot 59 and into grooves 61 in the sides of the frame 1. (See Figs. 5, 6, 7, 16.) Journaled on a vertical pivot 62 in a slot 63 in the lower part of 115 the cross-head 23 is an antifriction-roller 64, which is of sufficient diameter to extend through the sides of slot 63 and engage either side of the guideway 65, which forms a part of the frame. (See Figs. 5, 9, 15.) The anti-120 friction-rollers 60 and 64 being fastened to the weight the engagement of the roller 60 with the grooves 61 and the engagement of roller 64 with the sides of the way 65 prevent rotation of the weight, except such amount as is 125 necessary where antifriction-rollers are used.

Journaled in the rear part of the head 23 is an antifriction-roller 66, which rolls on a track 67 in the bottom of the guideway 65. (See Figs. 5, 9, and 16.)

Secured to the cross-head 23 and extending laterally therefrom through the frame is a handle 68, by which the operating mechanism can be moved rearwardly by hand. (See Figs. 5 2, 3, 4, 9.) The handle 68 passes through the web of the cross-head 23 and has on its end a tooth 69, which is inclined on its front and rear faces. (See Figs. 9 and 11.) Secured to the inside of the frame 1 is a spring-catch 70, 10 (see Figs. 5, 8, and 11,) the rear end of which is formed with inclined faces, the forward one of which engages the rear inclined face of the tooth 69 after the weight has passed into its extreme forward position and holds the weight 15 in that position until the cartridge is fired. The engaging faces of the tooth and catch being inclined the force of the explosion when imparted to the weight will cause the disengagement of the tooth 69 from the catch by

20 the weight being forced rearwardly. The mechanism for ejecting the cartridgecase is as follows, referring especially to Figs. 5 and 12: The ejector-finger 82 is fulcrumed in a recess in the side wall of the frame on a 25 pivot 83, which projects through an elongated slot 84 in the ejector-finger, whereby the ejector is allowed a longitudinal movement as well as an oscillating movement. To the forward end of the ejector 82 there is attached one end 3° of a spring 85, the other end of the spring being attached to the frame. The tendency of the spring 85 is to hold the ejector forward with the pivot 83 at the opposite end of the slot 84 from that shown in Fig. 12. Secured 35 to the side wall of the frame in the recess is a plate-spring 86, which presses against a flange 87 on the side of the ejector 82 and tends to hold the ejector in the position shown in Fig. 12. On the rear end of the ejector is a hook 4° 88, against which the cartridge-case is pulled by the extractor 49. In the lug 45' is a slot 89 to permit passage of the ejector 82 in the reciprocation of the bolt and to permit the hook 88 to swing inwardly far enough to en-45 gage the cartridge-case. In the head of the bolt 27 is a longitudinally-perforated plunger 90, which has a limited movement in the head of the bolt.

The conveyer consists of a series of holders 5° linked together and running over the sprocket 33. In the form shown in Figs. 2, 3, 4, and 7 the end of each holder 91, which points toward the rear of the piece, is closed by a wall 92. The end wall of each holder is fastened 55 to a link 93, and the links 93 are connected with each other by pins 94, thus forming a chain which carries the holders. The pins 94 extend outward from the chain, and the extended portions engage with the notches 95 in 60 the periphery of the sprocket. The pins are formed with heads 96 on their outer end, and the heads being larger in diameter than the notches 95 in the sprocket form guides to hold the chain on as it passes over the sprocket. Mounted at the side of the piece is a table 97, which supports the conveyer and cartridges as they approach the sprocket. The sprocket is rotated to draw the conveyer in the manner already described, thus feeding the cartridges into position to be engaged by 70 the injector-pawl 47. (See Figs. 5 and 10.) The table 97 is provided with upwardly-extending side walls 98, which guide the cartridges and conveyer. (See Figs. 2 and 10.)

Pivoted in the trigger-guard 110 is the trigger 111, having a rearwardly-extending projection 112, which engages the under side of the forward end of the sear 113. (See Figs. 4 and 5.) Sear 113 is pivoted in a recess in the under side of the frame and has on the upper side of its rearward end a lug 114, which extends up through the lower wall of the frame and engages the front face of the lower part of the cross-head 23 when the piece is cocked. Secured to a plate 115, pivoted to 85 the frame at 116, is a spring 117, which presses up against the under side of the sear 113 near its rear end.

The operation of the piece is as follows: Assume that the piece is cocked ready for 90 firing, the sear 114 engaging the cross-head 23 of the weight, as shown in Fig. 5. There is no cartridge as yet in the chamber of the barrel; but the conveyer is at rest, with a cartridge partly resting on the incline 148, formed 95 on the outer periphery of the spring-case 30 and with the bullet in position at the foot of the incline 147. The weight and bolt are in their rearward position and are locked together against telescoping movement with re- 100 lation to each other by reason of the inclined surfaces 79 on the forward ends of spiral ways 26 being in engagement with the inclined surfaces 78 on the rear ends of the lugs 43 on the bolt, and the bolt is held from rotary move- 105 ment by the engagement of the lugs 45 and 45' on the front end of the bolt with the guideways 61 in the side walls of the frame. The rod 29 being a part of the weight, as previously stated, is also in its rearward position 110 and the mainspring 71 is compressed. The pawl 41 is in engagement with one of the ratchet-teeth 40 on the rear end of the springcase 30, preventing the spring from rotating backward. Pawl 47 in the forward end of the 115 bolt 27 is at this time held down by spring 48 in a position ready to engage the head of the cartridge during the forward movement of the bolt. When the trigger is pulled, (see Fig. 4,) the lug 114 on the sear is drawn down 120 out of engagement with the cross-head of the weight, permitting the weight and bolt carried by the weight to be pulled forward by the spring 71. During the movement of the weight forward as far as the position shown 125 in Fig. 6 the weight and bolt will retain the same position relative to each other, the weight having moved straight forward, the antifriction-rolls 60, 64, and 66 traveling in their respective guideways. The cartridge 130

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will have been engaged by the injector-pawl 47 and pushed forward and upward into the chamber. As the point of the bullet ascends the incline 147 the cartridge-holder 90 holds 5 the cartridge so that the forward end of it does not jump upward out of line with the mouth of the chamber. When the bullet strikes the top of the inside of the chamber, the lower side of the cartridge will be resting 10 on the lower side of the mouth of the chamber, and as it is pushed still further forward the rear end of the cartridge will be tipped upward, bringing the flange of the cartridgecase into engagement with the extractor 49 15 and also bringing the cartridge central with the center of the bolt, as shown in Fig. 6. The spiral face 75 on lug 45 at the forward end of the bolt will have engaged the spiral face 76 on lug 77, which projects from the 20 rear end of the barrel, as shown in Fig. 14, and is in position to traverse the spiral face 76. The ratchet-sleeve 35 at the forward end of the rod 29 will have partly traversed the spiral way 39. When the weight and bolt in their con-25 tinued movement forward have reached the position shown in Fig. 7, the spiral face 75 on lug 45 will have traversed the spiral face 76 on lug 77, and the bolt will have completed its forward movement by coming in contact 30 with the rear end of the barrel. It will also have given to the bolt its primary rotary movement and have disengaged inclined faces 78 on lugs 43 at the rear end of the bolt from the inclined faces 79 on the forward end of 35 spirals 26, and the weight will have moved forward sufficiently for the spirals 26 to have completely traversed the engaging spiral faces 44 on the bolt, thus completely locking the bolt and bringing the forward ends of the 40 straight ways 25 into the rear end of the spaces between lugs 43. The cartridge will have been pushed clear into the chamber. In going from the position shown in Fig. 7 to that shown in Fig. 8 the weight will move 45 straight forward, carrying the split bushing 51 against the shoulder 52 in the frame and carrying the shoulder 128 of the firing-pin against the rear end of the plunger 90, thus holding the forward end of the plunger 90 in 50 contact or nearly in contact with piston 42 in the cartridge and carrying the forward end of the firing-pin through the plunger 90 and against the primer in the base of the cartridge. During this portion of the forward 55 movement the lugs 43 on the rear end of the bolt are in engagement with the straight ways 25 in the rear part of the spiral cylinder 24 and prevent rotation of the bolt, thus keeping it safely locked. The ratchet-sleeve 35 60 being mounted on the rod 29, which is a part of the weight, will also be brought to its most forward position and will have been rotated by the spirals 39 sufficiently to advance another tooth on the hub 34. The spring-catch 65 70 will also have been brought into engage-

ment with the tooth 69 on handle 68, which is fast to the cross-head 23, (see Fig. 11,) thus holding the parts in the position shown in Fig. 11 until the powder is ignited. The spring 155 will have been compressed by the 70 forward momentum of the weight acting through rod 29. In Fig. 8 all parts are in their most forward position and the primer has just been detonated. Upon the ignition of the powder the pressure developed will 75 drive the piston 42 rearwardly, the movement being accelerated by the springs 155 and carrying with it the plunger 90 and all parts of the weight, the plunger being brought to a stop by the shoulder 190, formed by the en- 80 largement of its forward portion coming in contact with the shoulder 191 in the bolt. (See Fig. 25.) While the piston 42 is moving back, the tooth 69 (see Fig. 11) will by the movement of the weight become disengaged 85 from the spring-catch 70. The weight will continue to move straight rearwardly with the bolt locked against rotation and against rearward movement until the entire length of the straight ways 25 have traversed the spaces be- 90 tween the lugs 43. As the bolt is locked against rotation during this straight rearward movement the bullet will have had time to get beyond the muzzle before the spiral ways 26 engage the inclined faces 44 of the lugs 95 43. The rod 29 and ratchet-sleeve 35 carried thereby are also moving rearwardly, the slots 37 in the ratchet-sleeve engaging the spirals 39, and thus rotating the spring-case 30 and the sprocket 33 to feed the next car- 100 tridge in the conveyer into the position shown in Fig. 5. As the weight moves still farther rearward the spiral ways 26 traverse the spiral faces 44 on lugs 43 and rotate the bolt and unlock it from the frame by disen- 105 gaging the lugs 45 and 45' from the recesses 46. The rearward movement of the weight while the bolt is being unlocked from the frame brings the cushion 151 at the end of this unlocking movement into contact with the for- 110 ward faces of the lugs 43 on the rear end of the bolt, and as the weight moves still farther rearwardly the cushion is compressed and the bolt is started rearwardly. As the bolt starts rearwardly, the extractor 49 on the bolt 115 being in engagement with the circumferential groove in the head of the cartridge-case, the cartridge-case is started from the chamber. The spiral faces 80 and 80' on the lugs 45 and 45' engage the spiral faces 81 and 81' in the 120 frame, and the bolt is given its secondary rotation while moving rearwardly, thus bringing the lugs 45 and 45' into the guideways 61 in the frame, which prevents further rotation of the bolt, at the same time bringing the in- 125 clined faces 78 on the lugs 43 into engagement with the inclined faces 79 on the forward end of the spiral ways 26, and thus locking the bolt and weight against longitudinal motion relative to each other. From this point the 130

bolt and weight move rearward as one piece, carrying the cartridge-case, which is prevented from dropping out of engagement with the extractor by the spring 50, which presses 5 upon the side of the head of the cartridge-case and holds it in engagement with the extractor until the head of the cartridge-case is brought into contact with the hook 88 on the ejector 82. As the extractor 49 pulls the side of the 10 cartridge opposite to the hook still farther rearwardly the forward end of the cartridge will be swung outward and be ejected. The completion of the rearward movement of the bolt will complete the turning movement of 15 the sprocket 33 and allow the pawl 41 to drop into the next notch of the ratchet on the rear end of the spring-case. The rearward movement of the weight is limited by the pad 54, which cushions the blow of the weight and 20 accelerates its forward movement by having been compressed by the weight. If the trigger has been released, so that the spring 117 can raise the sear into engagement with the cross-head, all parts will be in the position 25 shown in Fig. 5. If the trigger has not been released, but is held back, as shown in Fig. 4, the spring 71 will pull the mechanism forward again, thus continuing the automatic fire so long as ammunition is supplied. In order to 3° remove the weight and bolt, the plug 53 is unscrewed from the frame. The catch 129 is raised, thereby releasing the cross-head 23 from the rod 29, after which the bolt and the major portion of the weight can be slid rear-35 wardly out of the frame, the handle 68 passing out between the upper and lower parts of the frame.

What we claim is—

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1. A firearm having a receiver, a bolt which 4° is both slidable and rotatable, a slidable weight, means for preventing rotation of the weight, connections between the bolt and weight which prevent turning of the bolt during the preliminary rearward movement of the weight, 45 connections between the bolt and receiver which prevent rearward movement of the bolt during the said preliminary rearward movement of the weight, connections between the weight and bolt by which the further rear-5° ward movement of the weight turns the bolt and unlocks it from the receiver, connections between the receiver and bolt which after the bolt is unlocked from the receiver still further turns the bolt, connections between the 55 weight and bolt which are brought into engagement with each other by said secondary turning of the bolt and prevent rearward telescoping movement of the bolt with relation to the weight, and connections between the re-60 ceiver and bolt by which the further rearward movement of the weight after the secondary turning movement of the bolt will cause the bolt to move with the weight.

2. A firearm having a receiver, a bolt which 65 is both slidable and rotatable, a slidable weight, means for preventing rotation of the weight, connections between the bolt and weight which prevent turning of the bolt during the preliminary rearward movement of the weight, connections between the bolt and receiver 7° which prevent rearward movement of the bolt during the said preliminary rearward movement of the weight, cam connections between the weight and bolt by which the further rearward movement of the weight turns the bolt 75 and unlocks it from the receiver, connections between the receiver and bolt which after the bolt is unlocked from the receiver still further turn the bolt, connections between the weight and bolt which are brought into en- 80 gagement with each other by said secondary turning of the bolt and prevent rearward telescoping movement of the bolt with relation to the weight, connections between the receiver and bolt by which the further rearward 85 movement of the weight after the secondary turning movement of the bolt will cause the bolt to move with the weight, said last-mentioned connections causing the bolt to also move with the weight during the preliminary 90 forward movement, connections between the bolt and receiver which partially turn the bolt after the preliminary forward movement and disengage the slide-actuating connections between the weight and bolt, and permit the 95 cam connections between the weight and bolt to come into engagement with each other whereby the further forward movement of the weight turns the bolt and locks the bolt to the receiver.

3. A firearm having a weight and a bolt both of which are slidable, the bolt being rotatable with relation to the weight, means for preventing rotation of the weight, laterally-projecting cam-faced lugs on the rear end of the 105 bolt forming grooves between them, a boltactuating cylinder forming a part of the weight, guides on the inner periphery of the said weight-cylinder which are straight in their rearward portion and spiral in their for- 110 ward portion with inclined faces on their ends which engage said rear lugs on the bolt, locking-lugs on the forward end of the bolt, a receiver, locking-recesses in the receiver to engage said locking-lugs in the forward position 115 of the bolt, guide-grooves in said receiver with which said locking-lugs are engaged during the straight sliding movement of the bolt to prevent rotation of the bolt, the forward ends of said spiral guides engaging the rear 120 lugs on the bolt during the first part of the forward movement of the weight and driving the bolt forward, fixed cam-faced lugs at the rear end of the barrel which engage the forward lugs on the bolt near the end of the for- 125 ward movement of the bolt and partially turn the bolt, thus disengaging the rear bolt-lugs from the ends of the spiral guides whereby in a portion of the further forward movement of the weight the sides of the spiral guides 130

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engage with the sides of the rear lugs and further turn the bolt and bring the forward bolt-lugs into the locking-recesses in the receiver, and bringing the straight guides on the weight into alinement with the grooves between the rear bolt-lugs so that during the latter part of the forward movement of the weight the said straight guides prevent rotation of the bolt.

4. A firearm having a weight and a bolt both of which are slidable, the bolt being rotatable with relation to the weight, means for preventing rotation of the weight, laterally-projecting cam-faced lugs on the rear end of the 15 bolt forming grooves between them, a bolt-actuating cylinder forming a part of the weight, guides on the inner periphery of the said weight-cylinder which are straight in their rearward portion and spiral in their forward 20 portion with inclined faces on their ends which engage said rear lugs on the bolt, lockinglugs on the forward end of the bolt, a receiver, locking-recesses in the receiver to engage said locking-lugs in the forward position 25 of the bolt, guide-grooves in said receiver with which said locking-lugs are engaged during the straight sliding movement of the bolt to prevent rotation of the bolt, the forward ends of said spiral guides engaging the rear lugs on 30 the bolt during the first part of the forward movement of the weight and driving the bolt forward, fixed cam-faced lugs at the rear end of the barrel which engage the forward lugs on the bolt near the end of the forward move-35 ment of the bolt and partially turn the bolt, thus disengaging the rear bolt-lugs from the ends of the spiral guides whereby in a portion of the further forward movement of the weight the sides of the spiral guides engage 40 with the sides of the rear lugs and further turn the bolt and bring the forward bolt-lugs into the locking-recesses in the receiver, and bringing the straight guides on the weight into alinement with the grooves between the rear 45 bolt-lugs so that during the latter part of the forward movement of the weight and during the preliminary rearward movement of the weight the said straight guides prevent rotation of the bolt, and the locking lugs and re-50 cesses prevent rotation of the bolt until the straight guides have retraversed the rear boltlugs, the retraversing of said rear lugs by the spiral guides turning said forward lugs out of the locking-recesses in the receiver, cam-faces 55 on the forward bolt-lugs which engage with cam-faces in the receiver and further turn the bolt so that the rear bolt-lugs engage the ends of the spiral guides on the weight-cylinder to prevent telescoping of the weight and bolt 60 during the continued rearward movement, and a shoulder on the interior of the forward head of the weight-cylinder which engages with the rear bolt-lug and drives the bolt rearwardly after it is unlocked.

5. A firearm having a bolt which is both slid-

able and rotatable, a slidable weight, means for preventing rotation of said weight, means for actuating said weight longitudinally, projections on the rear part of said bolt, spiral guides on said weight having cam-faced ends 70 which engage said rear bolt projections during the preliminary forward movement of the weight and during the latter part of the rearward movement of the bolt, a receiver, connections between said receiver and bolt where- 75 by during the preliminary forward movement of the weight the bolt is prevented from rotation, and the engaging ends of the spiral guides cause the bolt to move straight forward, connections between said bolt and receiver 80 which after the weight and bolt have moved a certain distance forward will partially turn the bolt and bring the rear end bolt projections into operative position for the turning action of the spiral guides, the said spiral 85 guides causing further turning of the bolt and bringing it into locking engagement with the receiver.

6. A firearm having a slidable bolt provided with lateral projections on its outer periphery 90 at its rear end, a cushion which surrounds said bolt forward of said projections, a slidable weight - cylinder which is adapted to telescope on said bolt, means for actuating the weight and bolt, means for stopping said bolt 95 after a limited forward movement and allowing the weight to move farther forward with relation to the bolt, means for locking said bolt in its forward position, connections by which the bolt is unlocked after the weight 100 has partially completed its rearward movement, an engaging portion in the forward part of the weight-cylinder which actuates the bolt rearwardly through the medium of said cushion after the bolt is unlocked and moves said 105 bolt rearwardly together with said weight.

7. A firearm having a movable weight, a bevel-faced tooth projecting from said weight, and a spring-latch secured to the frame having a bevel-faced head which engages with said tooth in the forward position of the weight.

8. In ordnance and firearms, a rotatable bolt having on its rear end two sets of inclined surfaces, those of one of said sets being of 115 greater inclination than those of the other set: a set of inclined surfaces on the forward end of reverse inclination to those on the rear end; a fixed member having an inclined surface which is engaged by the inclined surfaces 120 on the forward end of the bolt, and a movable member having two sets of inclined surfaces one set of which is of greater inclination than the other, the set of lesser inclination on the movable member engaging the set 125 of lesser inclination on the rear end of the bolt and working in unison with those on the forward end of the bolt to actuate the bolt spirally to disengage those of lesser inclination and bring those of greater inclination on 130 · . · · . :

the movable member into engagement with those of greater inclination on the bolt to rotate the bolt, substantially as described.

9. In ordnance and firearms, a movable 5 weight which includes a head, a firing-pin which is fixed to said head, a bolt-actuating cylinder fixed to said head and surrounding the body of said firing-pin, and a rod fixed to said head outside of said cylinder and extend-10 ing parallel therewith, all of said parts together forming the weight and moving as one piece, in combination with a bolt within said weight-cylinder and surrounding the body of said firing-pin, and means whereby the mover5 ment of the said weight actuates said bolt.

10. In ordnance and firearms, a movable weight including a cross-head, a firing-pin which is fixed to said cross-head, a bolt-actuating cylinder fixed to said cross-head and sur-20 rounding the body of said firing-pin and a rod fixed to said cross-head outside of said cylinder and extending parallel therewith, all of said parts moving as one piece and together forming the weight, in combination with a 25 cartridge-conveyer and intermediate mechanism actuated by said weight-rod whereby the rearward movement of said weight actuates said cartridge-conveyer.

11. In ordnance and firearms, a movable 30 weight having a cross-head, a bolt-actuating cylinder fixed to said cross-head, a firing-pin which is a fixed part of the weight and a rod which carries the mainspring and is fixed to said cross-head outside of said cylinder and 35 extends parallel therewith, said cross-head, bolt-actuating cylinder, firing-pin and rod together forming the weight and moving as one

piece, substantially as described.

12. In ordnance and firearms, a movable 40 weight having a cross-head, a bolt-actuating cylinder fixed to said cross-head, a firing-pin which is a fixed part of the weight, a rod which is fixed to said cross-head outside of said cylinder, a mainspring carried by said 45 rod, a rotatable ratchet carried by said rod, means actuated by the movement of the weight to rotate said ratchet, a cartridge-conveyer and intermediate mechanism by means of which the said ratchet actuates the cartridge-

50 conveyer, substantially as described. 13. A firearm having a slidable weight, means for preventing the weight from rotating, a rotatable cylinder, means for preventing said cylinder from longitudinal move-55 ment, a rotatable ratchet on said weight, means for preventing rotation of the ratchet during the movement of the weight in one direction, spiral connections between said ratchet and cylinder whereby the rearward move-60 ment of the weight rotates said cylinder, a sprocket-wheel mounted on said cylinder, and a cartridge-conveyer driven by said sprocket-

wheel whereby the rearward movement of

the weight actuates the conveyer.

14. In ordnance and firearms, a movable

weight, a rod which forms a part of the weight, a mainspring carried by said rod, a rotatable case surrounding said spring and rod and fixed against longitudinal movement, a rotatable grooved ratchet-sleeve mounted on said rod, a 70 toothed hub mounted on said rod having a tooth which engages said ratchet, spirals in said spring-case which are engaged by said sleeve and thereby rotate the spring-case during the rearward movement of the weight, a 75 cartridge-conveyer, and intermediate mechanism actuated by the rotation of the said case to actuate the cartridge-conveyer during the rearward movement of the weight, substantially as described.

15. In ordnance and firearms, in combination with a movable weight, a spring-cushion which is engaged by the weight near the end of its forward movement and a spring-catch which is secured to the frame and engages the 85 weight at the end of its forward movement,

substantially as described.

16. In ordnance and firearms, a movable weight which includes as part thereof a rod which extends alongside of the breech and go barrel, a mainspring carried by said rod which actuates the weight in its forward movement, and a spring-cushion for the rod at the end of its forward movement, substantially as described.

17. In ordnance and firearms, a movable weight, a rod which forms a part of the weight, a mainspring carried by said rod, a rotatable case surrounding said spring and rod, a rotatable grooved sleeve mounted on said 100 rod, ratchet connection between said rod and sleeve whereby the said sleeve is held from turning on said rod during the rearward movement of the rod, spiral connections between said sleeve and case whereby the rearward to5 movement of the rod rotates said case, a sprocket-wheel mounted on said case, and a cartridge-conveyer driven by said sprocket whereby the rearward movement of the weight actuates the conveyer, substantially as de- 110 scribed.

18. A firearm having a breech mechanism, an upwardly-inclined guideway in the frame for the forward end of the cartridge toward the chamber, an upwardly-inclined rest for 115 the body of the cartridge, a series of cylindro-segmental cartridge-holders flexibly connected together, means actuated by the breech mechanism at each rearward movement thereof to move the said cartridge-holder so as to 120 bring one of said holders into position to hold a cartridge in line with the mouth of the cham-

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

FRANKLIN K. YOUNG. JAMES E. SHERIFF.

Witnesses:

WILLIAM A. COPELAND, ROBERT WALLACE.