No. 678,937. Patented July 23, 1901.

J. M. BROWNING.

AUTOMATIC GUN.

(Application filed June 19, 1900.)

(No Model.) 4 Sheets—Sheet 1.

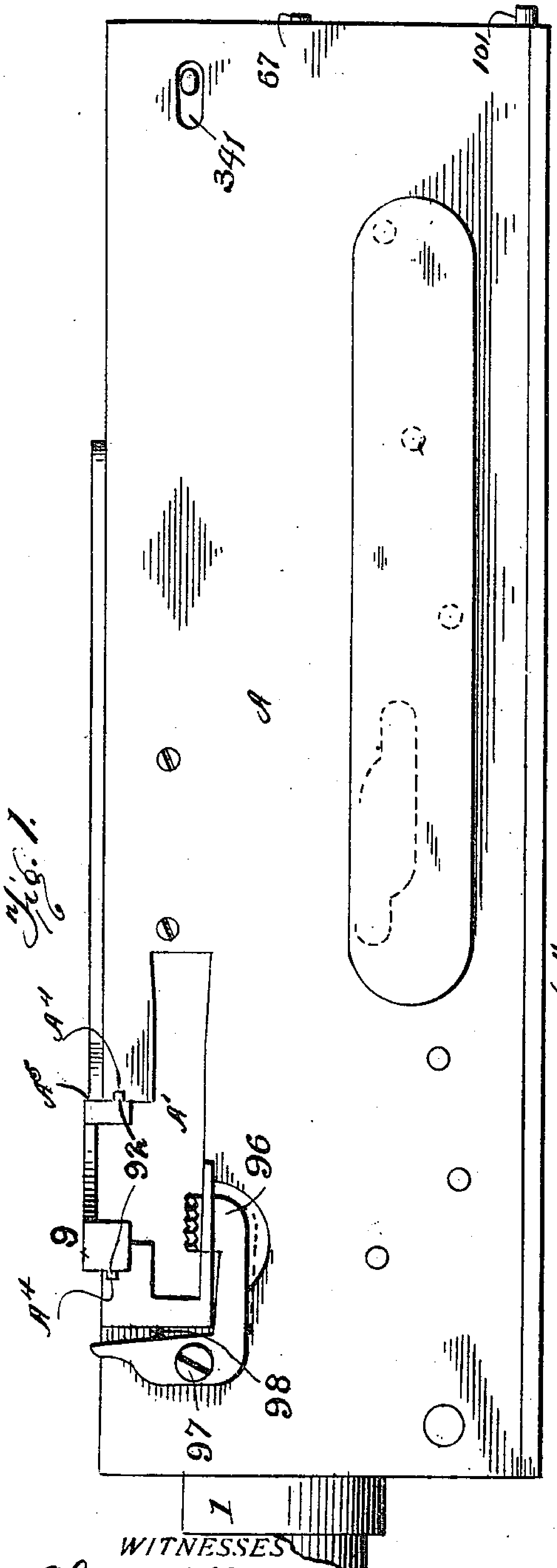

Fig. 1.

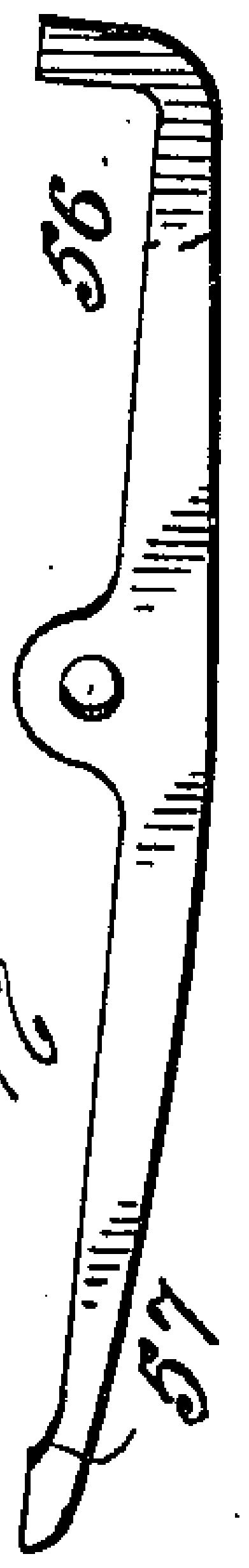

Fig. 15.

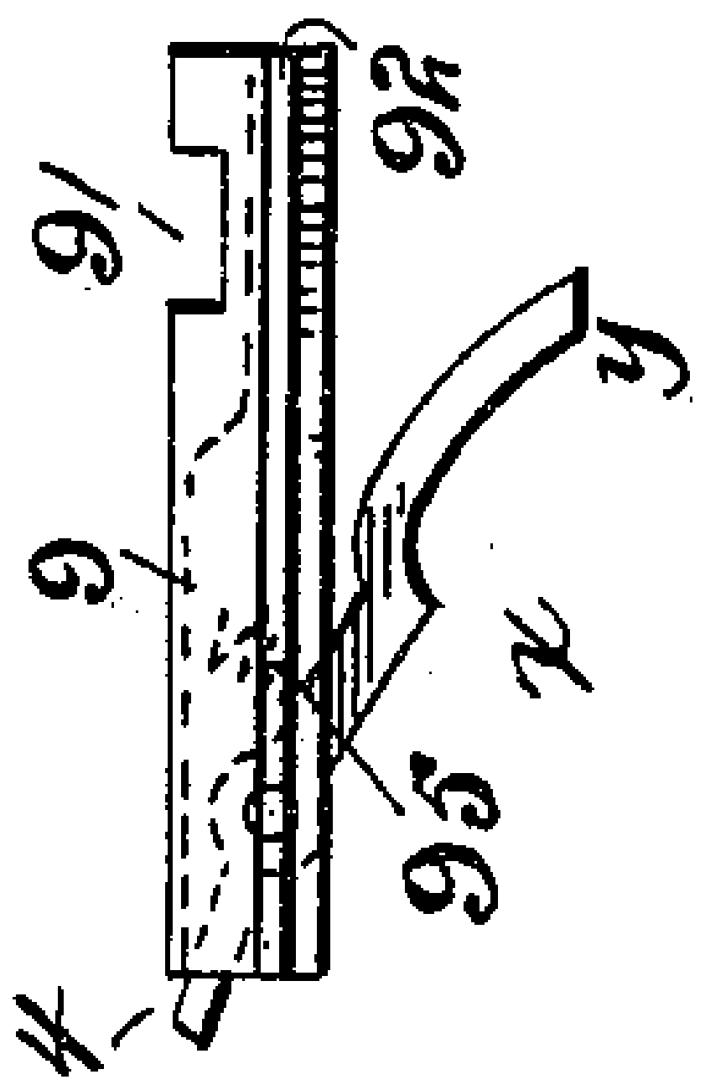

Fig. 14.

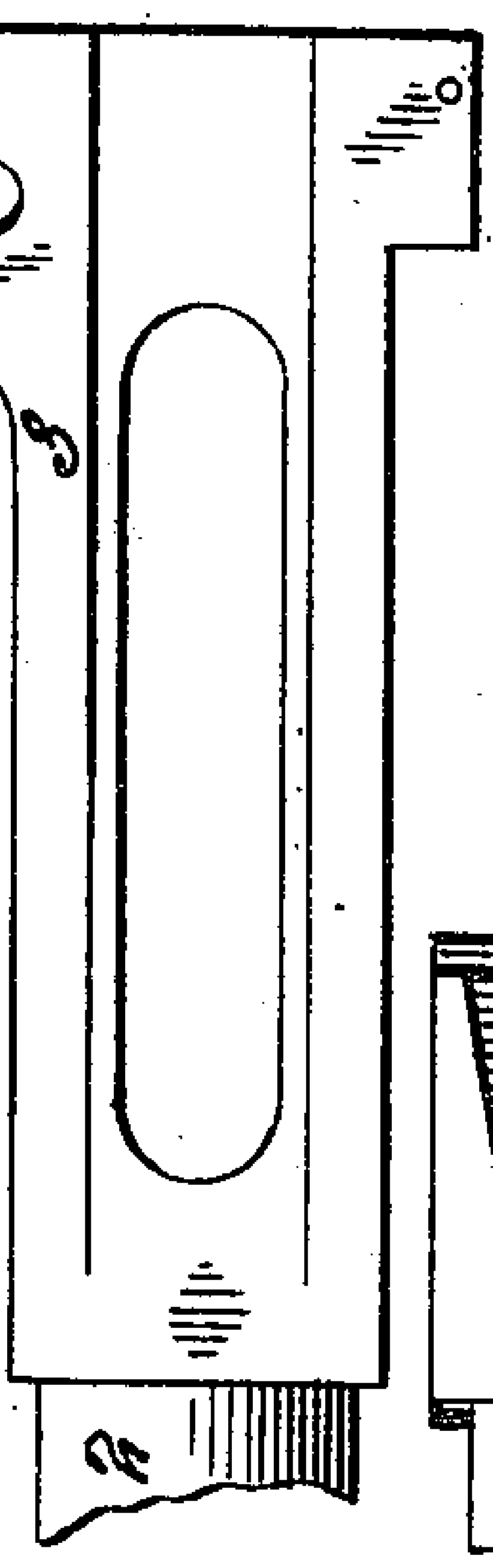

Fig. 17.

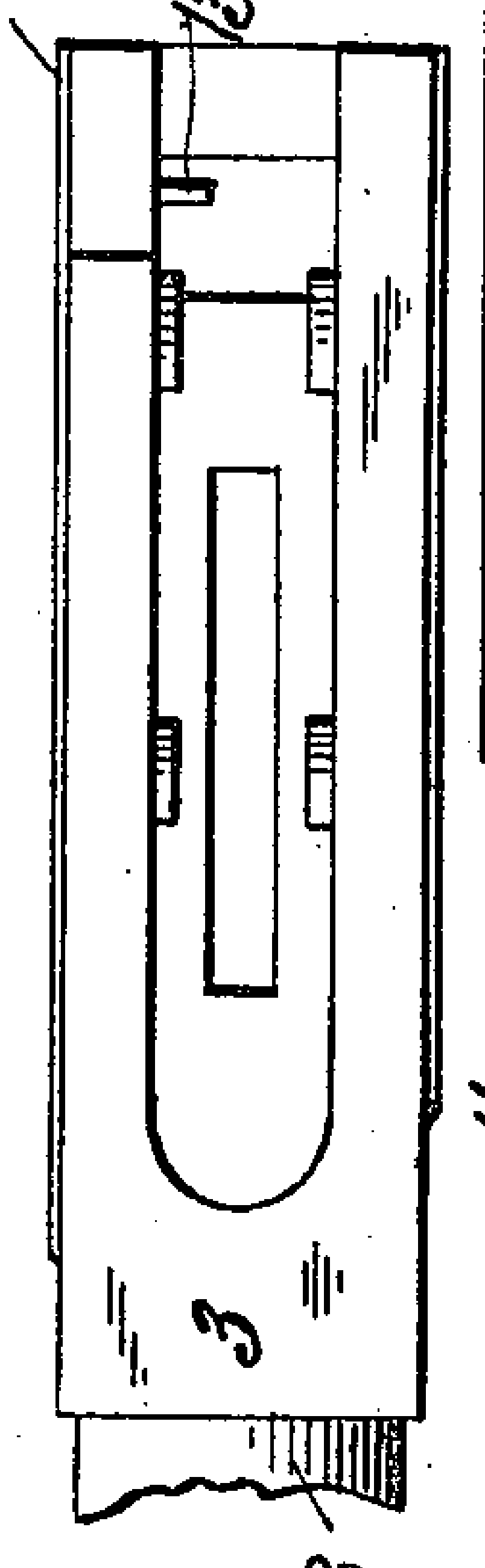

Fig. 16.

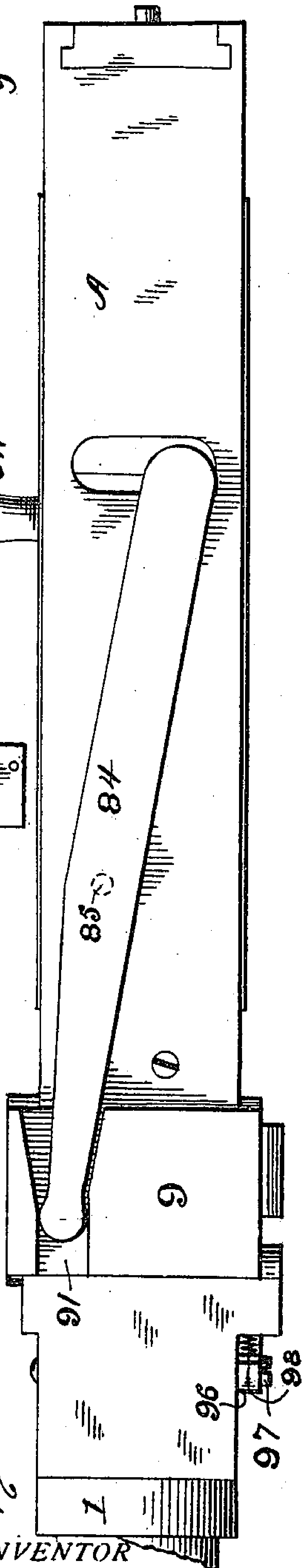

Fig. 2.

WITNESSES

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(No Model.) 4 Sheets—Sheet 2.

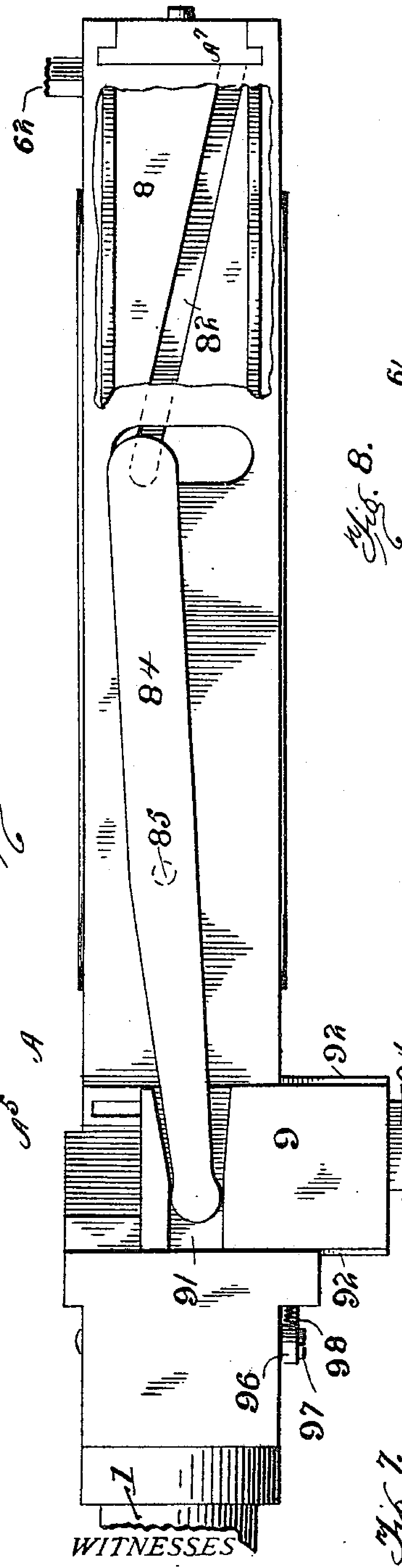

Fig. 3.

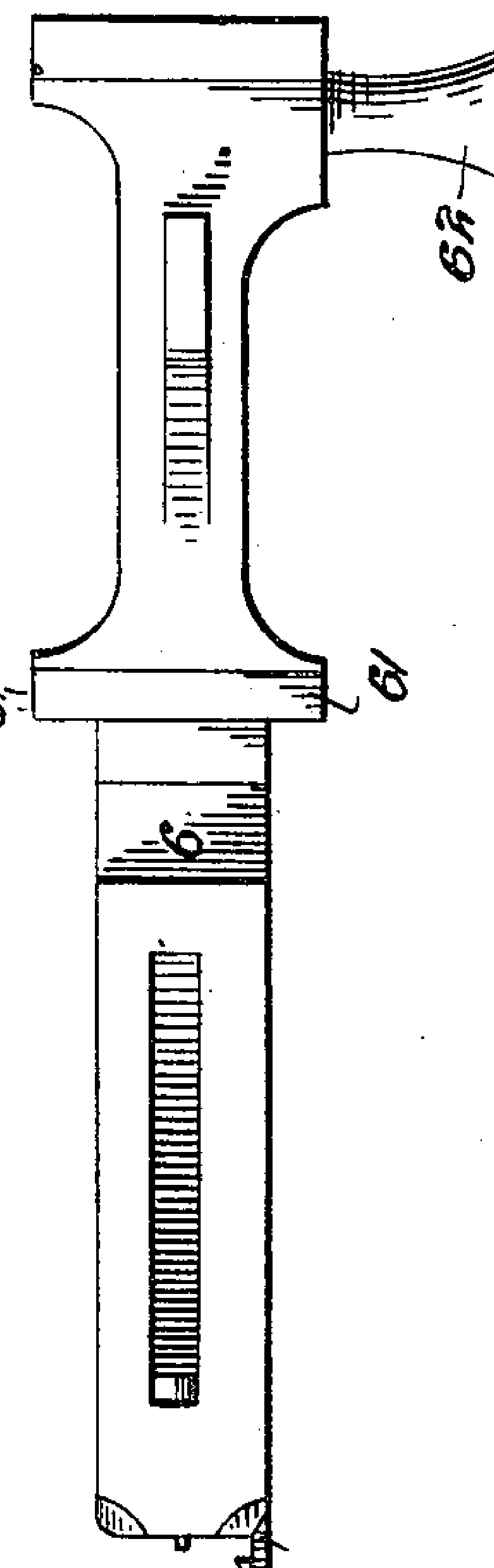

Fig. 8.

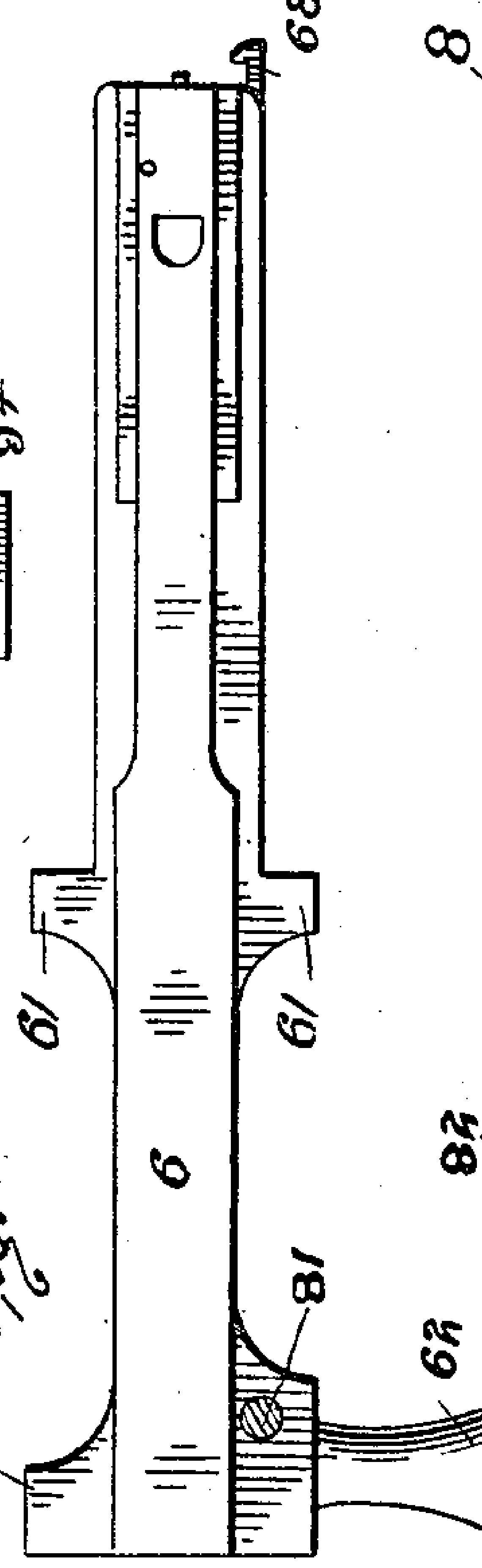

Fig. 7.

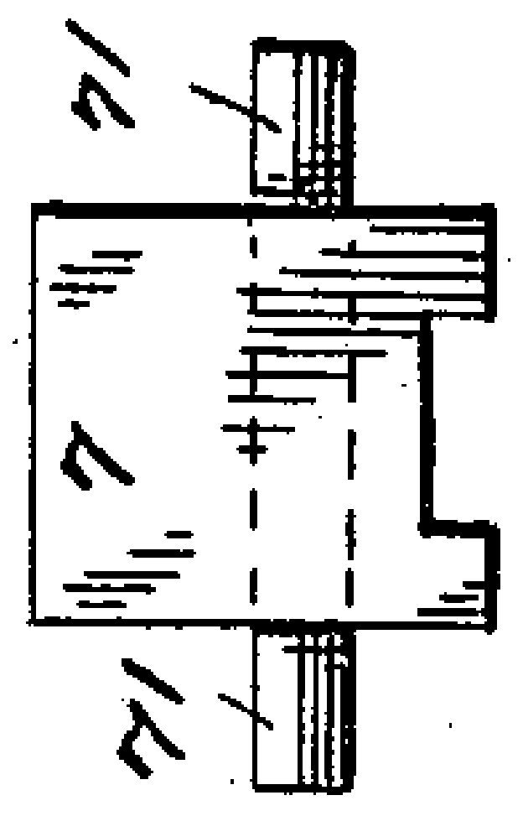

Fig. 11.

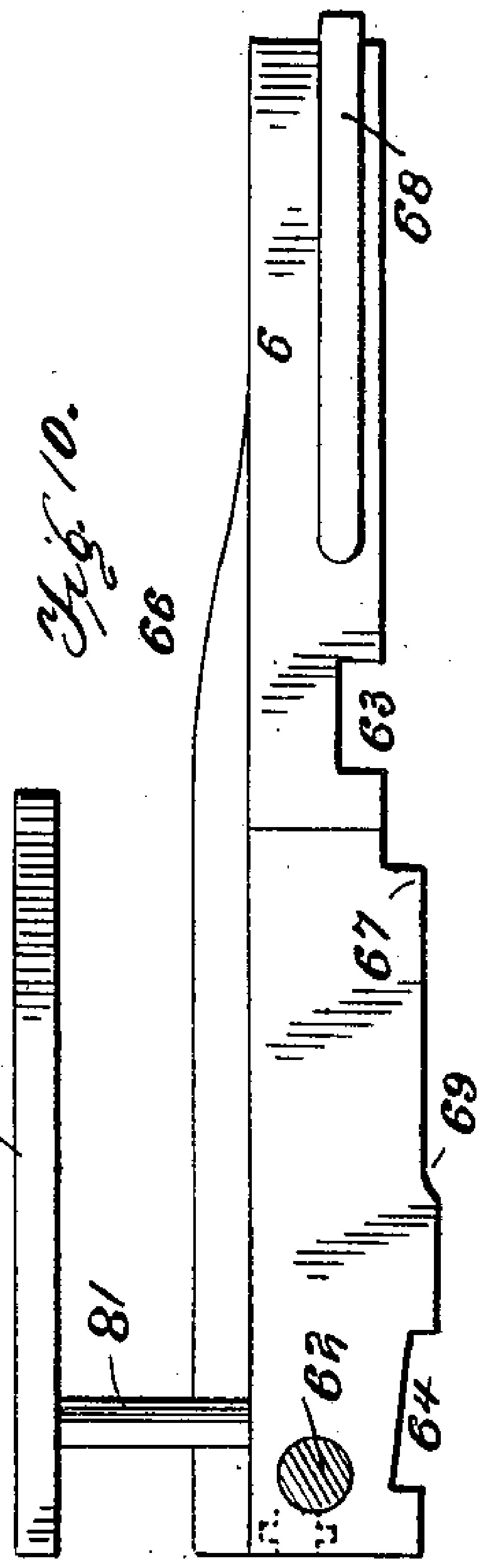

Fig. 10.

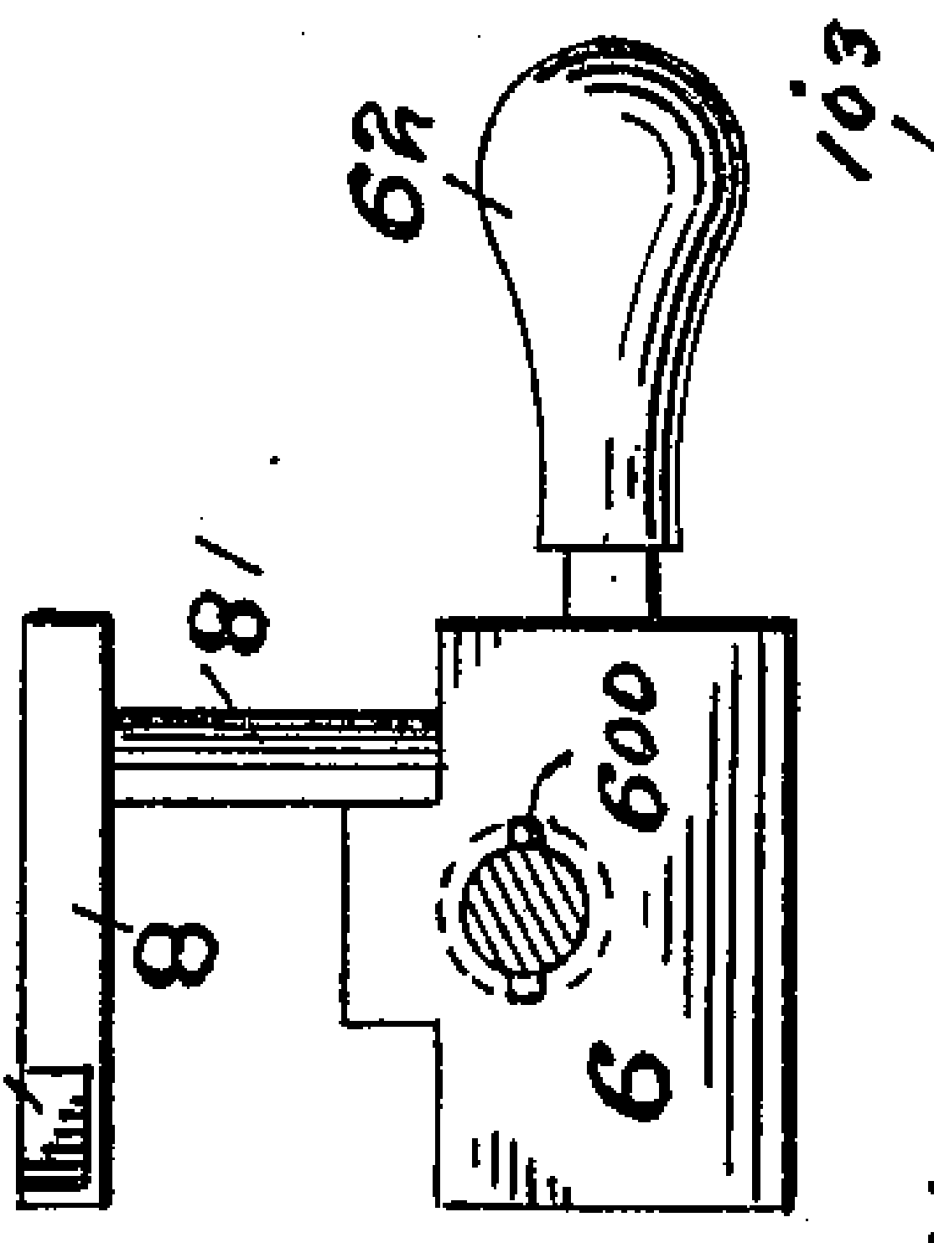

Fig. 9.

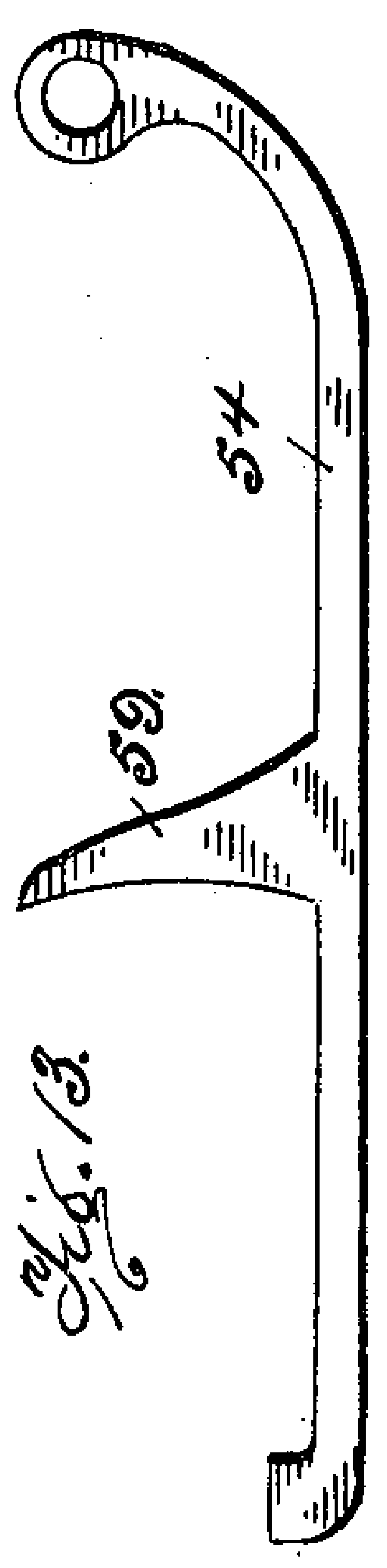

Fig. 13.

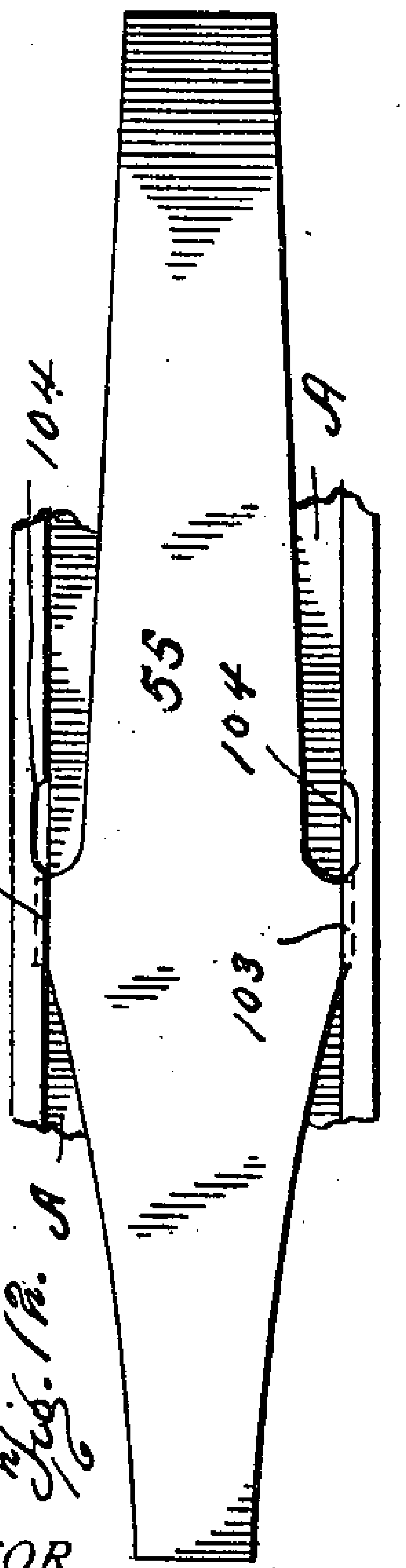

Fig. 12.

WITNESSES

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No. 678,937.

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(No Model.)

4 Sheets—Sheet 3.

Fig. 4.

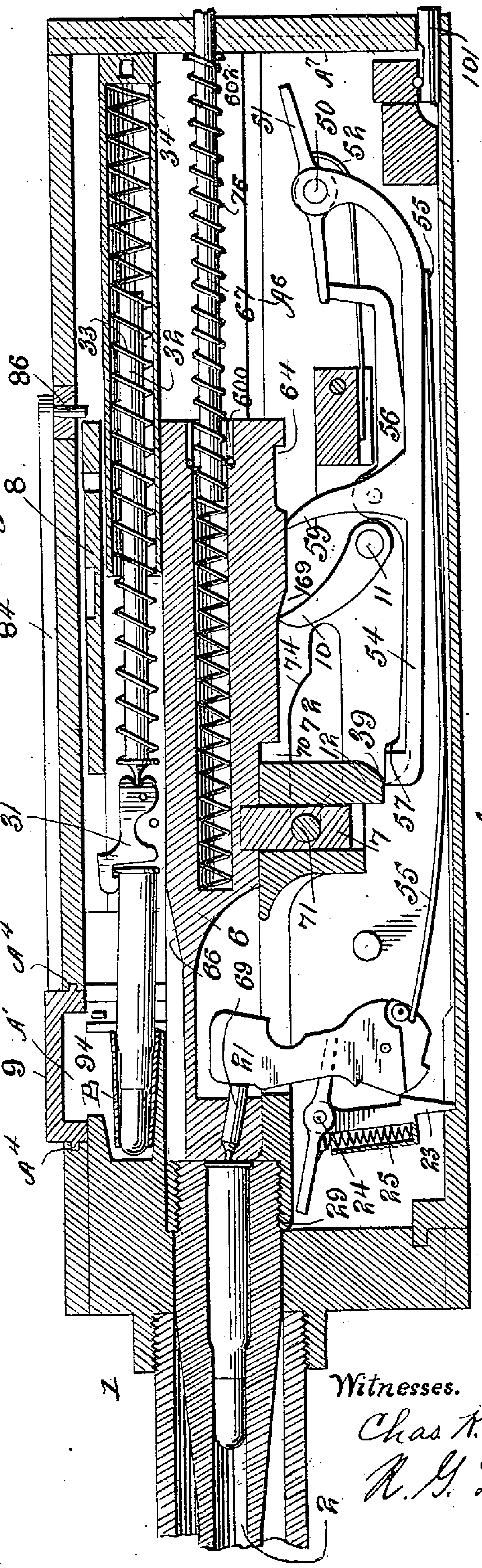
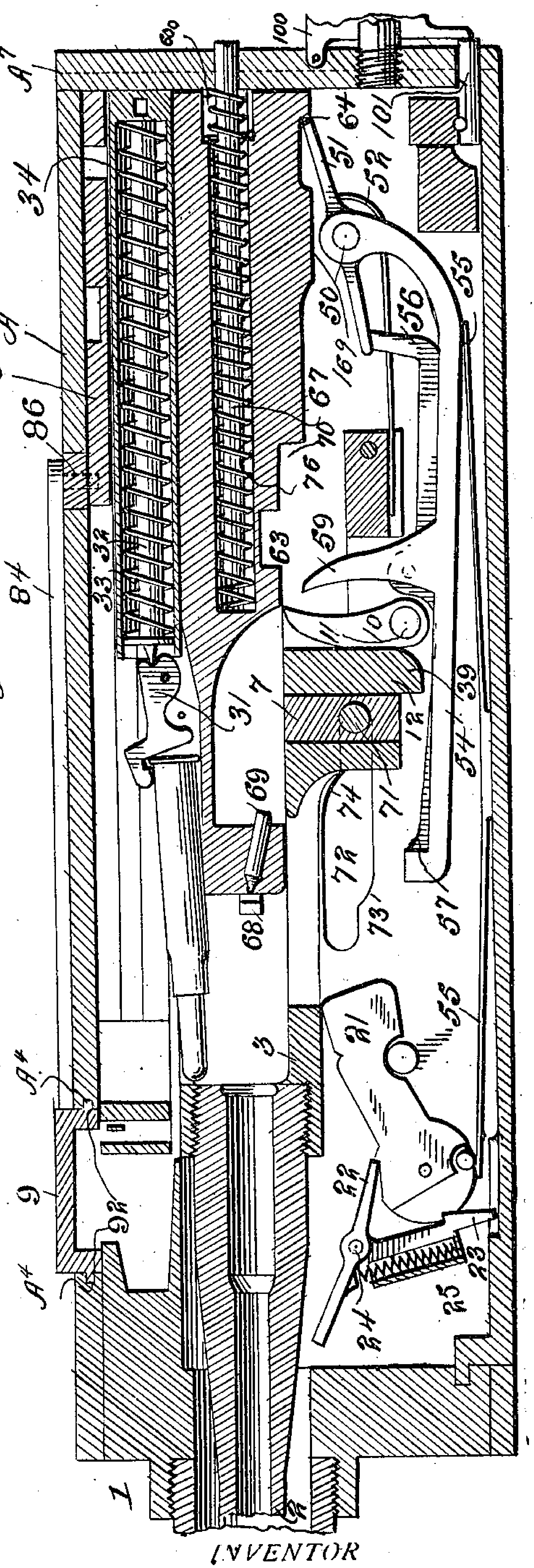


Fig. 5.



Witnesses.

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No. 678,937. **Patented July 23, 1901.**

J. M. BROWNING.

AUTOMATIC GUN.

(Application filed June 19, 1900.)

(No Model.) 4 Sheets—Sheet 4.

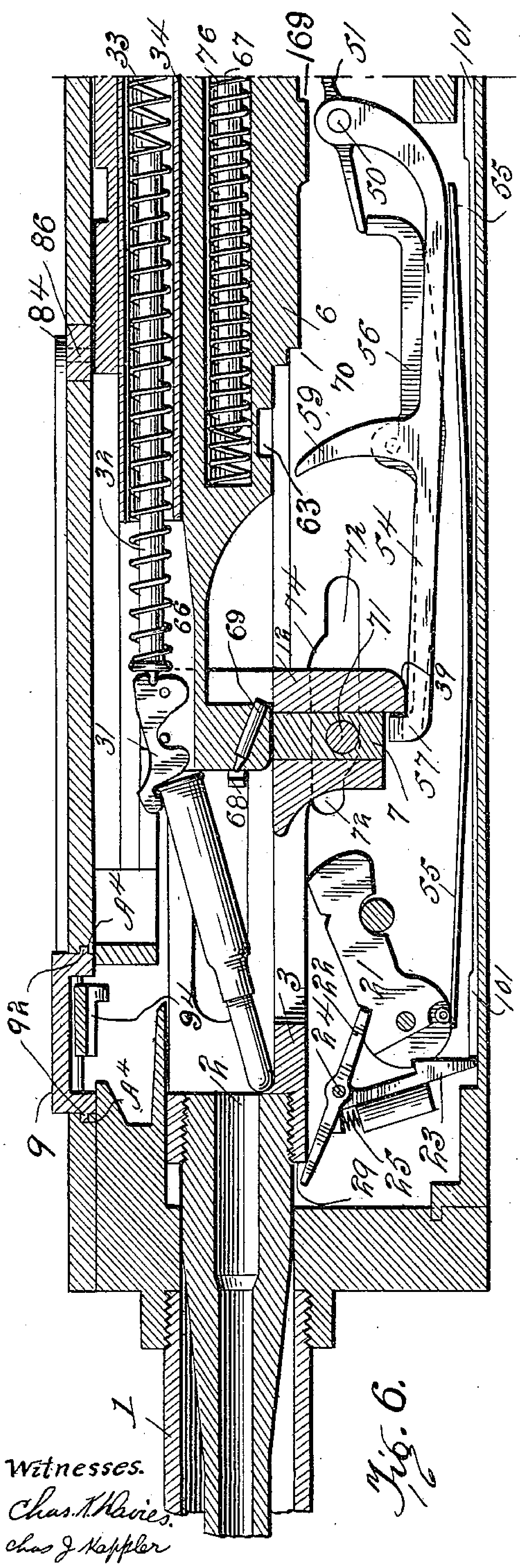

Fig. 6.

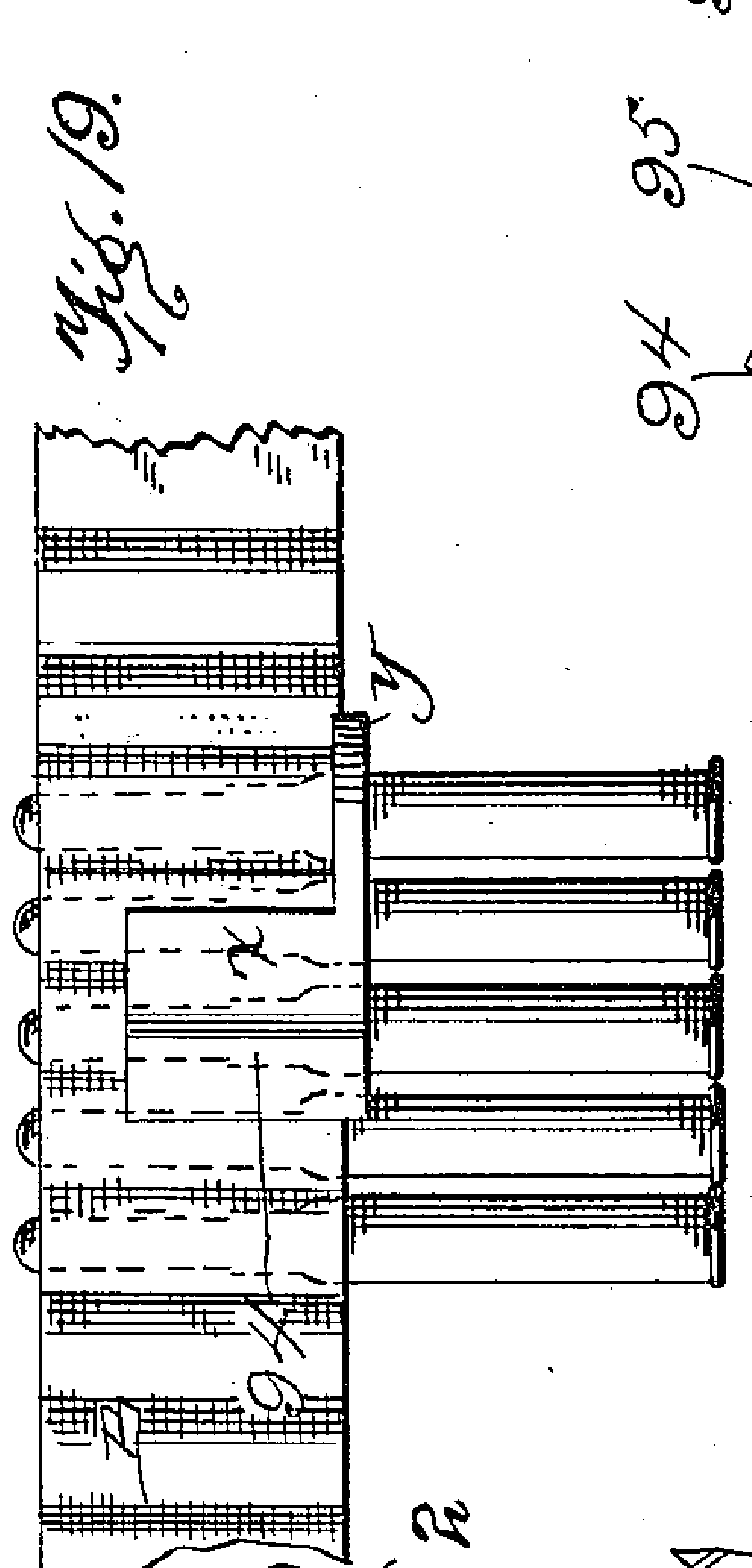

Fig. 19.

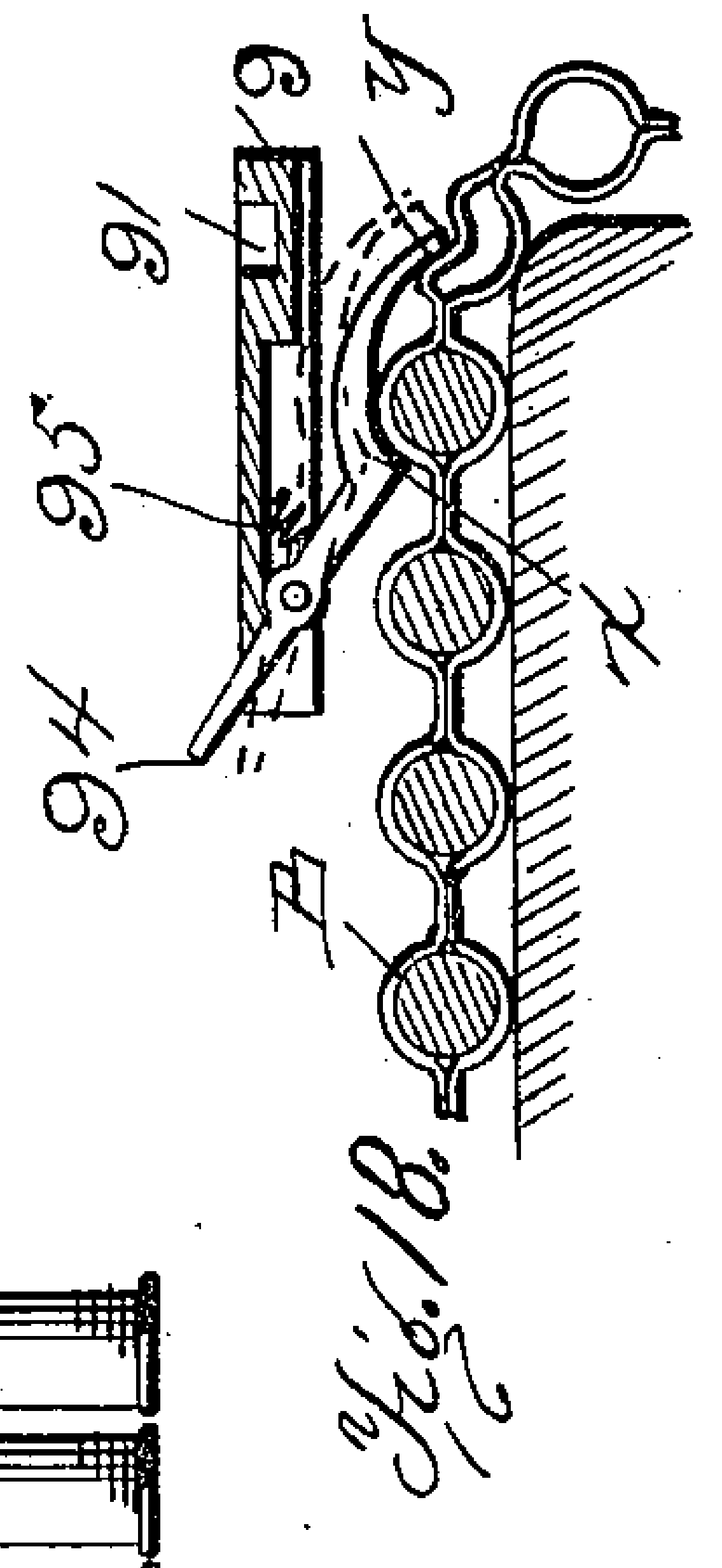

Fig. 18.

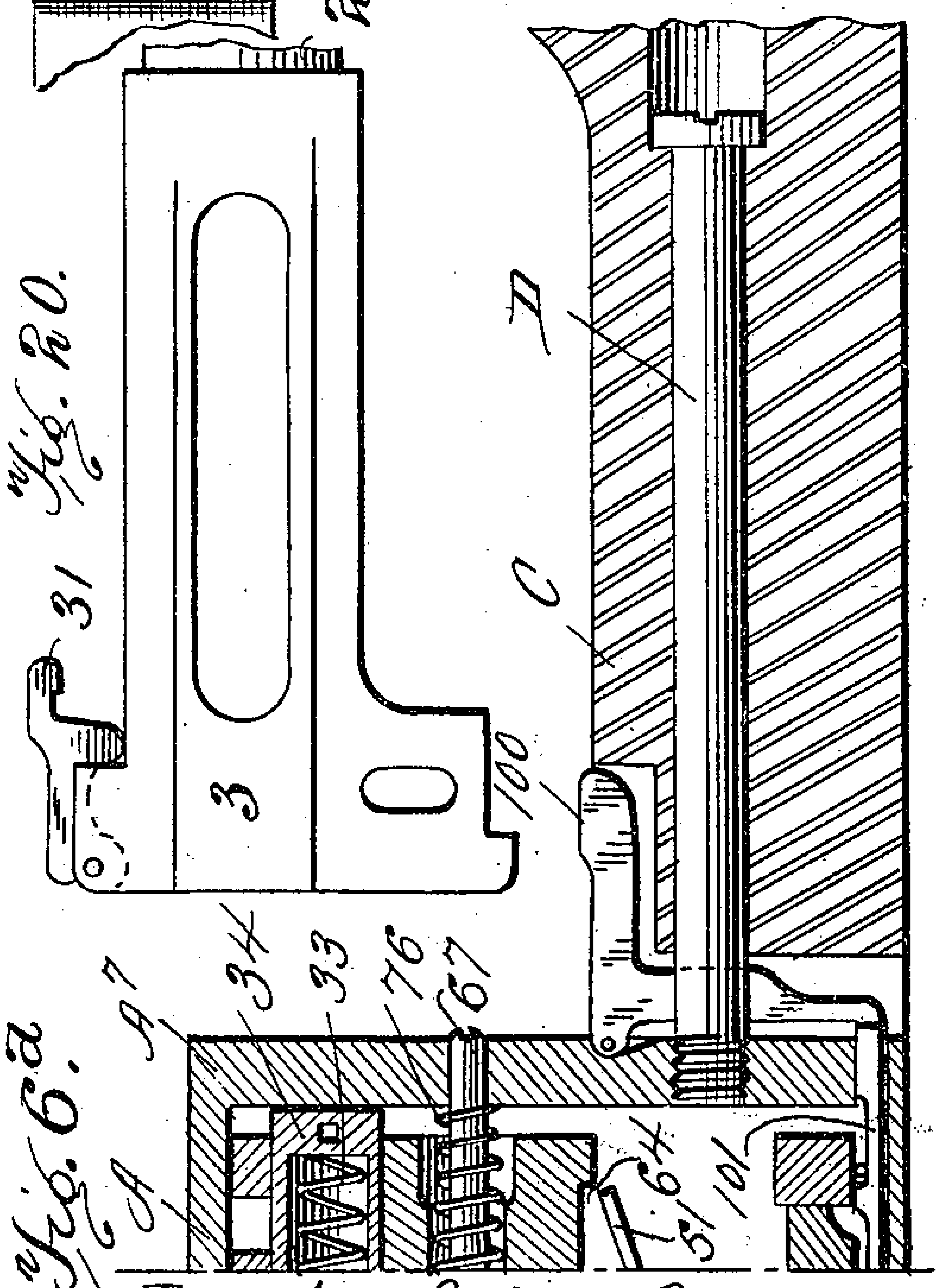

Fig. 20.

Fig. 6a.

Witnesses.
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Chas J Kappler

Inventor J. M. Browning.
By M A Bartlett.
Attorney.

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

UNITED STATES PATENT OFFICE.

JOHN M. BROWNING, OF OGDEN, UTAH.

AUTOMATIC GUN.

SPECIFICATION forming part of Letters Patent No. 678,937, dated July 23, 1901.

Application filed June 19, 1900. Serial No. 20,874. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. BROWNING, a citizen of the United States, residing at Ogden, in the county of Weber and State of Utah, have invented certain new and useful Improvements in Automatic Guns, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to automatic guns.

The object of the invention is to produce an automatic gun which may be fired with great rapidity, using cartridges from a belt, yet which shall be light enough for manual transportation and which may be fired from the shoulder by the use of a rest, if needful. All the operations of loading and firing after the first cartridge are effected by the recoil. The barrel and barrel extension move back in the casing under the influence of recoil, and the bolt moves in the same line, part of the time with the barrel, being locked thereto by a vertically-moving locking-block, and part of the time the bolt has an independent movement in the same line as the barrel movement.

The invention consists in certain improved constructions and combinations of elements employed in guns of this class.

Figure 1 is a side elevation of the rear portion of the gun, showing the barrel-casing broken away. Fig. 2 is a top plan of the rear portion of the gun; and Fig. 3 a similar plan, partly broken away, showing feed-lever in different position. Fig. 4 is a longitudinal central section of the operative mechanism of the gun in closed position, as at the instant of firing. Fig. 5 is a similar section of the gun with barrel and bolt in recoiled position. Figs. 6 and 6^a are similar sections with some parts omitted, showing also connection to the shoulder-piece. Figs. 7 and 8 are top and bottom plans, Fig. 9 an end elevation, and Fig. 10 a side elevation, of the bolt. Fig. 11 is a detail elevation of the locking-block. Fig. 12 is a plan of the mainspring, showing manner of interlocking with casing, a part of which is shown broken away. Fig. 13 is a detail elevation of the barrel-latch. Fig. 14 is an elevation of the feed slide and pawl. Fig. 15 is a side elevation of the bolt-latch trip. Fig. 16 is a top plan of barrel extension. Fig. 17 is a side elevation thereof inverted. Fig. 18 is a sectional detail or diagram showing manner of engagement of cartridge-feed pawl with cartridges and belt. Fig. 19 is a plan diagram of cartridges, belt, and feed-pawl. Fig. 20 is a detail elevation of barrel extension and cartridge-carrier.

The main casing A is a rectangular box, of metal, inclosing most of the operative mechanism of the gun. The barrel tube or casing 1 is connected to the front of this box by screw-thread or otherwise, and the barrel 2 is arranged within this and the main casing, so as to recoil therein. The barrel is pressed forward in the casing by a spring 33, the front end of the barrel being guided in the tube 1 and the rear end of the barrel being rigidly connected to the barrel extension or receiver 3, moving within casing A. The barrel extension 3 is generally rectangular and has guide-tongues 4 on each side, which tongues slide in longitudinal grooves A^6 in the casing A as the barrel moves backward and forward. The extension or receiver has a receptacle for the bolt to slide in and is open at the top to receive the cartridge and at the sides to permit of the shell ejection.

The breech-bolt 6 is generally rectangular in its body portion and has side tongues 61, which slide in the same grooves in the casing as do the tongues 4 of the barrel extension. The bolt 6 has a handle 62, which projects through a slot in the side of the casing A to draw back the bolt for the entry of the first cartridge. The barrel extension has a vertical mortise near its rear end, and in this mortise a locking-block 7 moves vertically, as shown, to lock the bolt to the barrel extension by engagement with the notch 63 in the bolt, Fig. 4. The locking-block 7 is operated by the engagement of its pin 71 with a cam-groove 72 in the casing. The pin may be on one or both sides of the locking-block, with grooves in the casing to correspond. As the barrel extension moves backward the block 7 is forced down by the engagement of pin 71 with the incline 74, and as the extension moves forward the incline 73 forces the locking-slide upward by cam engagement, thus locking the parts by a block moving at right angles to the line of resistance. A pin 50 in the casing serves as a pivotal support for the bolt-latch 51, which is pressed up into engagement with notch 64 in the bolt when the bolt is in retracted position by a spring 52, suitably supported in the casing. The barrel-latch 54 is also pivoted on pin 50, and its front end is pressed up by the rear end of mainspring 55 to engage projection 12 on the barrel, and so hold the barrel locked for an instant until the bolt overtakes it, as will be explained. The bolt-latch trip 56 is pivoted on a pivot in the casing, (shown in dotted lines, Figs. 4, 5, and 6,) and its arm 57 is in position to be engaged by projection 39 of the barrel extension to hold the bolt-latch at certain times so it cannot latch the bolt in open position (see Fig. 6) and to release said bolt so that it may close forward into the receiver at the proper time when the bolt is locked to the barrel extension or receiver by the locking-block, as has been explained.

The cartridges are contained in a belt B, preferably of canvas, which belt incloses the bullets and the front ends of the cartridge-shells, leaving the flanges and most of the body of the cartridges uncovered. The belt is fed through the transverse opening A' in the casing above the plane of the barrel, and cartridges are drawn back from the belt by the carrier 31 and transferred downward into the receiver or barrel extension, as will be explained. The cartridge-carrier 31 is pivoted to the upper part of the barrel extension or receiver. It has a hook which extends a little way over the top of the cartridge in the belt when the barrel is in forward position. A plunger 32 bears against the rear end of carrier 31 above the carrier-pivot, the plunger being pressed forward by spring 33, and both plunger and spring may be moved back into the tube 34 in the casing as the barrel moves back, the spring 33 being compressed by such movement. Tube 34 may be held in place by a key or pin passing through the side of the casing and into mortise 341 in the rear end of the tube. This spring 33 then tends to press the barrel forward after its recoil as well as to force down the front end of the carrier. The bolt 6 is inclined on top, as indicated at 66, and lifts the carrier as it moves forward under the same in closing into the barrel extension or receiver, as will be explained. The bolt is returned after recoil by coiled spring 76, which spring is seated in a hole bored in the rear of the bolt, and the spring is guided on a rod 67, which is sustained in the rear end of the casing A. The bolt is connected to a cartridge-feed cam 8 by a pin 81, which holds the bolt and feed-cam in rigid relation. The cam 8 has a groove 82, extending obliquely in its upper surface. Feed-lever 84 is pivoted to the outside of the casing at 85 and has a pin 86 extending through a hole in the casing and entering cam-slot 82. The reciprocation of the bolt and cam-slide 8 thus rocks feed-lever 84 on its pivot 85. When the bolt is closed, the cam-slide 8 is just forward of pin 86, and when the cartridges are in feeding position the backward movement of the bolt and its cam-slide will cause the cam-slide to operate the feed-lever, and thus move the cartridge-feed slide or feed-pawl slide 9 transversely of the casing in the guideways in the casing. The engagement of the feed-lever with the feed-pawl slide is a common connection. Feed-lever 84 extends in a groove 91 in the feed-pawl slide 9. The feed-pawl slide 9 has guide wings or ribs 92, which guide said slide in guide-grooves A^4 at the sides of slot A^5 in the casing A. The slide 9 carries feed-pawl 94, which is pivoted to said slide and is pressed down by a spring 95. The feed-pawl is a metallic plate arching over the top of a cartridge in the belt and of such width that it bears on the belt and on the cartridges at the side of the belt. The pawl bears by its shoulder x on the belt and indirectly on the cartridge within the belt. The end y of the pawl is held up by the cartridge in the belt, if there be one beyond the cartridge properly acted on by the shoulder x, and this engagement with the point y, if there be an undrawn cartridge, lifts point y and the shoulder x, so as to keep the pawl from feeding the belt along; but if the cartridges be properly drawn the point y of the feed-pawl falls and the shoulder x then acts as a feeder. The feed-stop 96 is pivoted at 97 to the casing, and its rear end projects upward through an opening on the plate on which the cartridge-belt rests and engages the belt just back of the second cartridge in the belt and holds the belt from slipping back when not engaged by the feed-pawl. This feed-stop is in the form of a bell-crank lever, and its operating end is lifted against the cartridge-belt by spring 98, which spring yields and permits the stop to yield downwardly without swinging forward, so that the belt of cartridges may be pulled over the stop by the action of the feed-pawl. The feed-stop presents an inclined face toward the incoming cartridge-belt and acts on the principle of a well-known sewing-machine feed.

The firing-pin 69 is carried by the bolt, and the extractor 68 is also carried by the bolt, both operating in usual manner.

The hammer 21 is pivoted in the casing and pressed upward by mainspring 55. The hammer may be held in cocked position by either or both of two sears 22 and 23, both pivoted on pin 24, but independently movable. A spring 25, connected to sear 23, bears on sear 22 to push it into engagement with a notch in the hammer, so that the two sears engage the hammer at different angles and both engage at the front side of the hammer or its hub. The sear 22 I term the "automatic" sear and sear 23 the "stop-sear." Sear 23 is connected to trigger 100 by slide-rod 101, and when the trigger is pressed down the slide-rod 101, which lies in the bottom of the casing, presses the sear 23 out of engagement with the hammer and fires the gun. Slide-rod 100 lies under the mainspring either in a recess in the casing or space is left for it under the mainspring. As long as stop-sear 23 is held forward the recoil of the barrel will cock the hammer, and sear 22 will hold it cocked until the engagement of the shoulder 29 on the barrel extension, in its forward movement, with the front portion of sear 22 trips this sear and permits the hammer to fall under the influence of the mainspring, thus firing the gun.

To check the recoil of the barrel, I use what I call a "cushion-rocker" 10, which is pivoted at 11 to the casing near the rearward limit of movement of the barrel extension. The cushion-rocker has a cam or snail face toward the front, and the rocker is turned forward by projection 70 on the bolt when the bolt closes. In its backward movement the projection 70 of the bolt rides over the top of the rocker, and the rear face of the projection 12 of the receiver engages the front face of rocker 10 at the other end, swinging back said rocker. The upper end of the rocker engages projection 70 of the bolt to force the bolt backward independently of the barrel. The cam-face of the rocker engaging projection 12 acts with constantly-increasing resistance as the rocker swings to check and stop the barrel and to transfer its energy to the movement of the bolt, which bolt, acted on by the longer leverage of the upper end of the rocker, is thrust back with increased velocity, its spring being compressed at the same time.

A shoulder-piece C of any usual form may be connected to the casing A by a bolt D or attached in other usual manner.

The operation is as follows: The belt, with its contained cartridges, is fed into the opening A′ in the casing until the flange of the first cartridge in the belt enters under the hook of carrier 31 and the second cartridge is just past the cartridge-feed stop 96. The feed-lever is now in position shown in Fig. 2 and the working mechanism as in Fig. 4. Now grasp handle 62 and draw the bolt back. As the bolt and barrel extension are in this position locked together by the locking-block 7, the barrel will move back with the bolt, compressing both barrel and bolt springs and cocking the hammer, which is caught by both sears. The cartridge is drawn back by the hook of the carrier. (It thus appears that the hammer cannot fall against the firing-pin except when the barrel is in its forward position, in which position the barrel and breech-bolt are firmly locked together.) When the pin 71 of the locking-block reaches the downward incline 74 of the cam-groove in the casing, the locking-block will be forced downward, freeing the barrel from the bolt. The barrel is then thrown forward by the action of its spring, carrying the cartridge with it. The pressure of plunger 32 throws down the forward end of the carrier, causing the front of the cartridge to fall into the receiver of the barrel extension, so as to move forward below the cartridge-belt. The forward movement of the barrel is stopped by the barrel-latch 54 engaging the projection 39 of the barrel extension. The projection 39 on the barrel extension or receiver at the same time rocks the bolt-latch trip, so that the bolt cannot be engaged thereby. (See Fig. 6.) The feed-lever 84, feed-slide 9, and feed-pawl will have been moved to the position of Fig. 3 by the backward movement of the cam 8. If the grasp on the bolt be now released, the bolt-spring will throw the bolt forward, carrying the cartridge into its chamber in the barrel. When the bolt is near the limit of its independent forward movement, the cam 69 on its under surface engages the arm 59 on the barrel-latch, thus forcing down said latch and releasing the barrel to continue its forward movement under the influence of the barrel-spring. The barrel and bolt then move forward together, and as pin 71 of locking-block 7 rides up the incline in the casing at 73 the locking-block is forced into engagement with the groove 63 in the bolt, so that the barrel and bolt are locked together. When about at the limit of its forward movement, the forward end of extension 29 of the barrel-piece strikes sear 22 and disengages this sear from the hammer, leaving the sear 23 in engagement and the gun in position for firing by bearing on the trigger 100. When the gun is fired and as long as the trigger is held down and cartridges supplied, the automatic action of firing will be continued in manner as has been explained, the sear 22 then alternately holding and releasing the hammer. The action of the bolt moves the cartridge-feed, as has been explained, and as long as there are cartridges in place in the belt the firing will continue unless trigger 100 is lifted, when the firing will cease. The cartridges are fed forward by the bolt almost their whole length while the barrel is held back by the barrel-latch. This allows them to feed into the receiver just forward of the retracted position of the carrier with little lost motion. As the barrel moves forward while the bolt is held back by the latch 51 a stud 139 on the left-hand side of the barrel extension, which extends into the path of the cartridge, (the bolt being grooved to allow it,) comes into contact with the rim of the fired shell as it is held back by the ejector and ejects the shell to the right through a suitable opening in the casing. When the gun is fired, the barrel recoils to a position farther back than when the bolt is drawn back by hand, and by its action on the cushion-rocker accelerates the backward movement of the bolt, while its own motion is gradually checked by the rocker, as explained. The bolt 6 has a bayonet-catch groove 600 cut around the bore, in which the bolt-spring 66 is inserted, and the rod 67, which guides the spring, has a pin 602 projecting at one side, which pin can enter said groove, so that when the spring is compressed and the rod forced into the bore of the bolt with its pin in the groove a partial turn of the rod will lock the spring in place, when the rear cover A^7 can be lifted if in place, as in Fig. 3, or can be applied to the casing if said cover has been removed and can then slide down over the rod. Then by drawing the bolt back the rear end of rod will project through the rear cover, and by turning the rod the spring is released and bolt thrown forward, and the rear cover is retained in place by the rod 67 projecting through a hole in said cover A^7. Mainspring 55 is a nearly flat spring, widest at the middle and having wings 103, which can enter notches 104 in the casing and then pass forward in the usual manner of tongue-and-groove connections, so that the mainspring may be readily removed, but will be firmly held when in place in the gun. The two ends of the mainspring bear upward against the hammer and barrel-latch, respectively.

While the gun has been described as in position to move the cartridges laterally and to lock the bolt by a vertical movement of the locking-brace, it will be understood that these terms are relative and that the parts would generally be operative if the positions were changed, as gravity is not relied on to operate any part of the mechanism. So a change of location in many instances would not change the principles and mode of operation of the gun. The claims are intended to point out the features of novelty, the use of equivalents being understood.

What I claim is—

1. The combination of the main casing having longitudinal guide-grooves, of the barrel and extension having guide-tongues which enter the grooves in the casing, and the breech-bolt adapted to slide in said extension and having tongues which enter the same grooves in the casing by which the barrel extension and bolt are both guided by the grooves in the casing and mutually support each other, substantially as described.

2. The combination of the casing having a cam-groove therein, of the barrel extension having a mortise, the locking-block in said mortise having a pin projecting into said cam-groove, and the breech-bolt having a notch with which said block engages to lock the bolt to the barrel extension and the barrel-latch operating to check the barrel and means for releasing the same, all substantially as described.

3. In a gun of the character described, the combination of the casing, the barrel and extension, and means for moving the barrel lengthwise in the casing, the bolt and means for moving the same lengthwise of the barrel extension the locking-block carried by the barrel extension and locking by movement at right angles to the barrel and bolt, a bolt-latch engaging the bolt to hold it retracted, and operating means between the bolt and latch and barrel, whereby the forward movement of the barrel releases the bolt-latch, substantially as described.

4. The combination of the casing, the barrel and extension, the reciprocating bolt and a locking-block moving at right angles thereto and forced into locking engagement with the bolt by direct cam engagement with the casing, a barrel-latch engaging the extension to hold the barrel retracted as described, and the bolt acting on said latch to trip the same, substantially as described.

5. The combination of the casing, barrel and extension reciprocating therein, the bolt moving in line with the barrel and means for locking the two together, separate springs for moving the barrel and the bolt, the bolt-latch in the casing acting to retain the bolt in open position and to be released by the barrel movement, and the barrel-latch engaging the barrel as described, and released by the bolt movement, all substantially as described.

6. The combination of the casing the barrel and extension forming the receiver, and means for moving the barrel and receiver lengthwise in the casing, of a cartridge-carrier pivotally connected to the receiver, engaging cartridges to draw them back with and force them downward into the receiver, and means for closing the breech, substantially as described.

7. The combination of the casing, the barrel and its receiver arranged to reciprocate in the casing, the carrier pivoted in the upper portion of the receiver in position to engage and draw back a cartridge as the receiver moves back, and a spring-pressed plunger engaging the carrier above its pivot, and acting to press the barrel forward by its pressure on the carrier, substantially as described.

8. The combination with the casing, the barrel and receiver reciprocating lengthwise therein, the cartridge-carrier pivoted in the upper part of the receiver and spring-pressed from the rear, and the bolt reciprocating in the receiver and casing and engaging the cartridge-carrier to swing the same upward, substantially as described.

9. In a gun of the character described, the bolt and feed-cam attached thereto and reciprocating longitudinally with the bolt a feed-lever pivoted to the casing and engaging such feed-cam to be oscillated thereby and also engaging the cartridge-feed slide, the feed-slide moving in transverse guideways and actuated by said lever, and a feed-pawl carried by said slide, all combined substantially as described.

10. In a gun of the character described, the longitudinally-reciprocating bolt and a feed-cam attached thereto, the transversely-reciprocating feed-slide and a pawl connected thereto and acting on the cartridges and belt substantially as described, a lever pivoted in the frame and engaging said feed-cam and

feed-slide, the feed-pawl on the feed-slide, and a feed-stop operating to hold the cartridge-belt when not engaged by the feed-pawl, all combined.

11. The combination of the transversely-moving cartridge-feed slide, and a spring-pressed pawl carried thereby, said pawl having a plurality of engaging points or surfaces, whereby the pawl will be held out of engagement with the cartridge it should feed when an undrawn cartridge in the belt lifts the point of said pawl, substantially as described.

12. The combination of the casing, the transversely-moving feed-slide, the pawl carried thereby and having two engaging points whereby it is upheld and detached by an undrawn cartridge, and a spring-actuated feed-stop having an inclined face toward the incoming cartridge, and yielding directly downward as the cartridge-belt moves over said stop, substantially as described.

13. The combination with the casing and reciprocating barrel, of the firing-hammer pivoted in the casing, and two sears engaging said hammer to hold it cocked, one sear being in line of movement of the barrel to be released thereby, the other sear being under control of the trigger and a single spring bearing said sears in opposite directions into engagement with the hammer, all substantially as described.

14. The combination of the casing, barrel, and receiver sliding lengthwise in the casing, the hammer pivoted in the casing, and two sears on a single pivot, engaging the hammer at opposite sides of their pivot, a spring bearing the noses of the sears into engagement with the hammer, means extending from the barrel by which one of the sears is tripped as the barrel moves forward, and a trigger operatively engaging the second sear, all substantially as described.

15. The combination of the casing, barrel reciprocating lengthwise therein, and bolt having additional movement in the line of the barrel movement, the cushion-rocker having a cam or snail face against which the barrel bears in its backward movement, and the bolt engaged by the long arm of said rocker, whereby the rocker serves to check the barrel and convey its energy to the bolt, at the recoil, substantially as described.

16. The combination with the casing and barrel reciprocating therein, of a cushion-rocker pivoted in the frame having a snail-face against which the barrel engages with a constantly-increasing resistance as the barrel presses back the rocker, and means engaging the rocker by which the energy of the barrel recoil is transmitted to another moving part, while the barrel is checked, substantially as described.

17. The combination with the bolt, bored from the rear, of a bayonet-catch groove surrounding said bore and opening to the rear, a rod having a pin projecting at the side to enter said groove, a coiled spring surrounding the rod and acting to press the bolt forward when the rod is unlatched from the bayonet-catch, and the casing having a perforated rear face-plate against which the spring finds a bearing to press the bolt forward, while the rod retains the cover, substantially as described.

18. The combination with the casing having undercut grooves, the hammer and barrel-latch, of the flat mainspring having side flanges to enter said grooves in the casing and be held thereby, in combination with the hammer and the barrel-latch against which the two ends of the mainspring bear, substantially as described.

19. In a gun of the character described, a reciprocating slide and a spring-pressed pawl carried thereby, said pawl having a contact-shoulder to act as a pusher, and a point projecting therefrom, combined with a slideway along which a flexible belt of cartridges is carried by said pawl, the belt collapsing under the point of the pawl when a cartridge is withdrawn, but otherwise lifting the point so that the contact-shoulder fails to feed, all combined substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN M. BROWNING.

Witnesses:
JOSIE ZITZMAN,
JOHN E. RAMSDEN.