(No Model.)

3 Sheets—Sheet 1.

J. W. STOCKETT.

ORDNANCE BREECH MECHANISM.

No. 601,176. Patented Mar. 22, 1898.

Fig. 1.

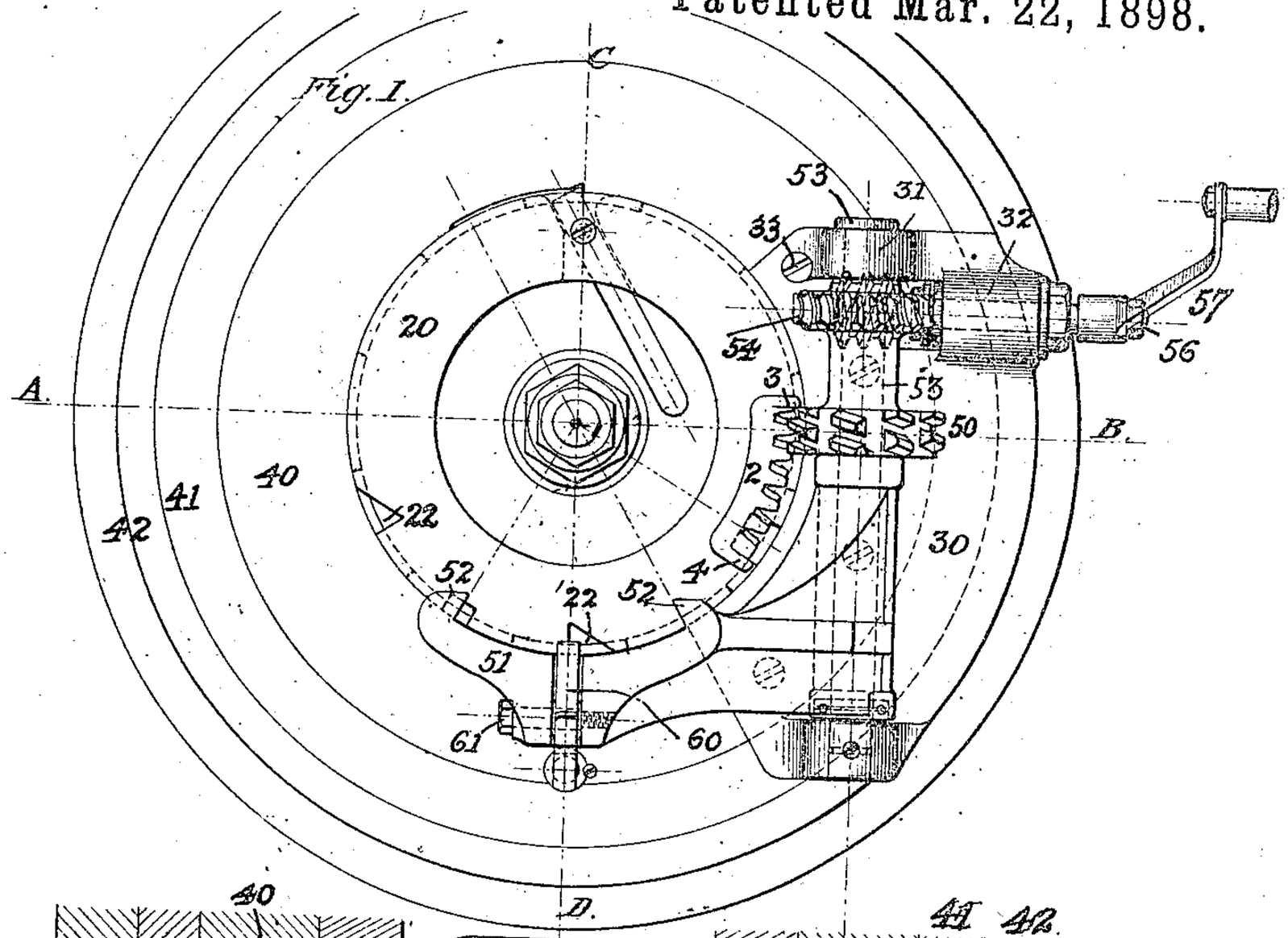


Fig. 2.

Witnesses:
B. C. Tiffany
Edwin K. Lundy Jr.

Inventor:
John W. Stockett
by E. P. Brooke
Atty

(No Model.)

3 Sheets—Sheet 2.

J. W. STOCKETT.

ORDNANCE BREECH MECHANISM.

No. 601,176

Patented Mar. 22, 1898.

Fig. 3.

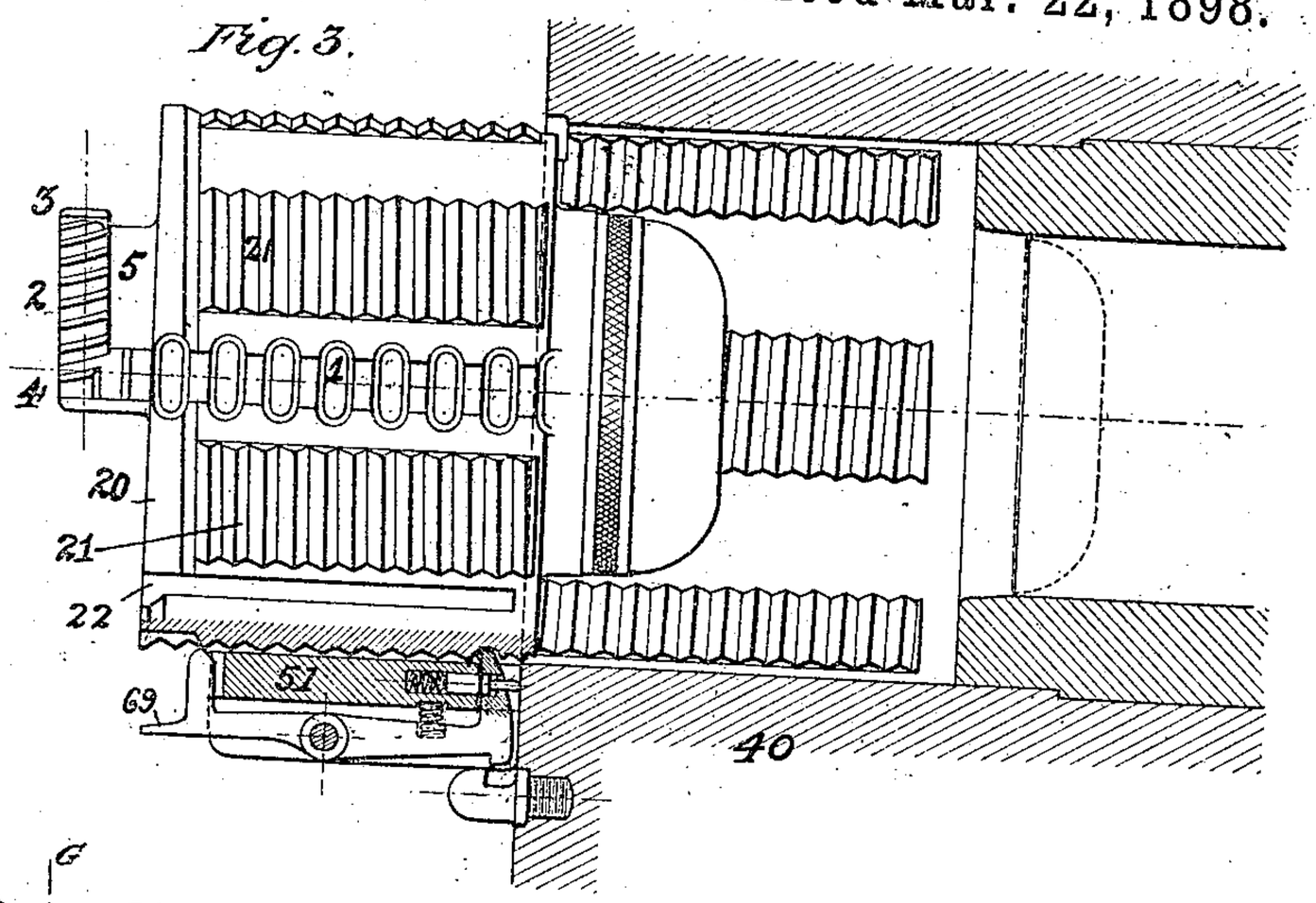


Fig. 4.

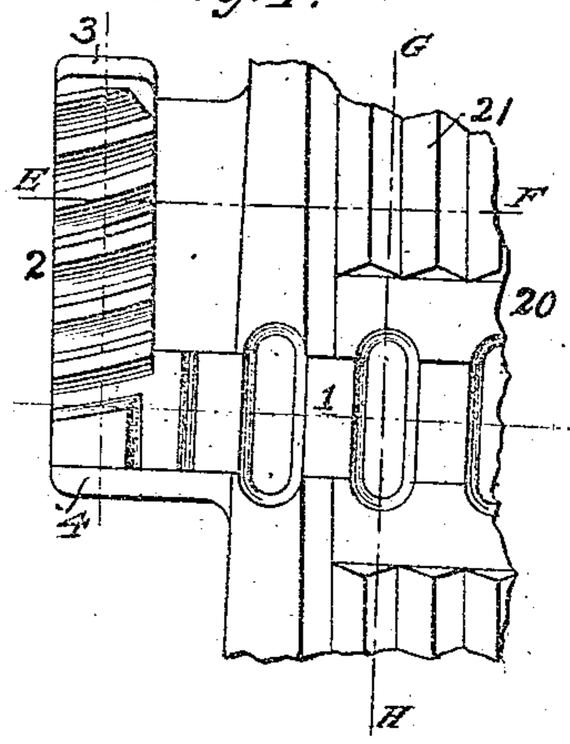


Fig. 5.

Fig. 6.

Fig. 7.

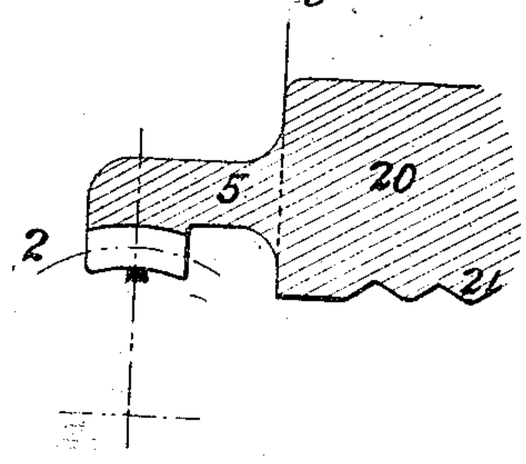
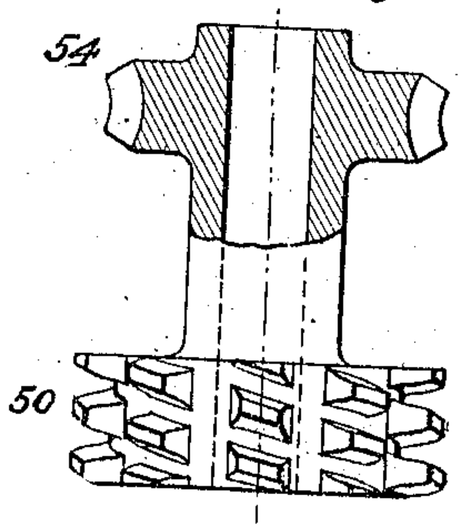


Fig. 8.



Witnesses:
B. C. Tiffany
Edwin S. Lundy Jr.

Inventor:
John W. Stockett
by F. D. Brock
Atty

(No Model.)

3 Sheets—Sheet 3.

J. W. STOCKETT.

ORDNANCE BREECH MECHANISM.

No. 601,176. Patented Mar. 22, 1898.

Fig. 10.

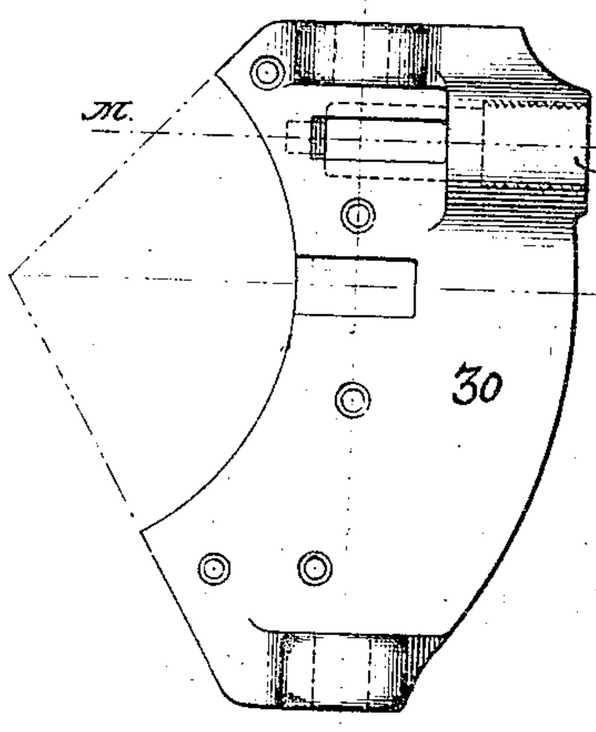


Fig. 11

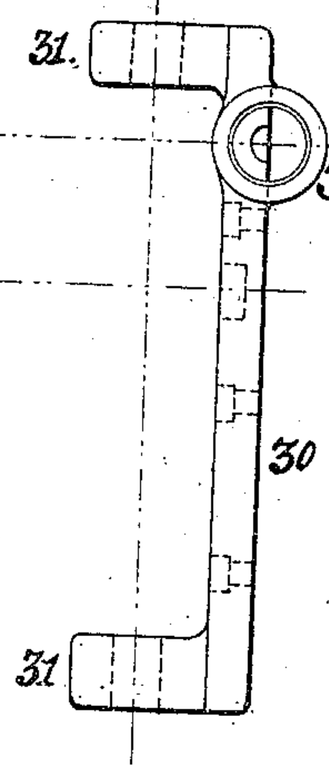


Fig. 12.

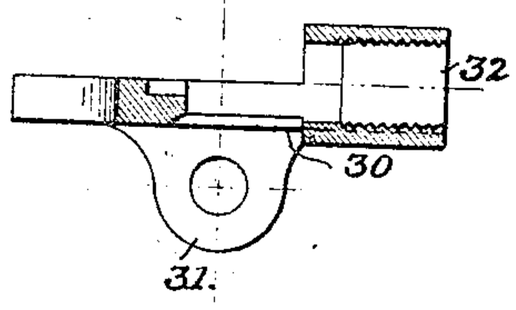
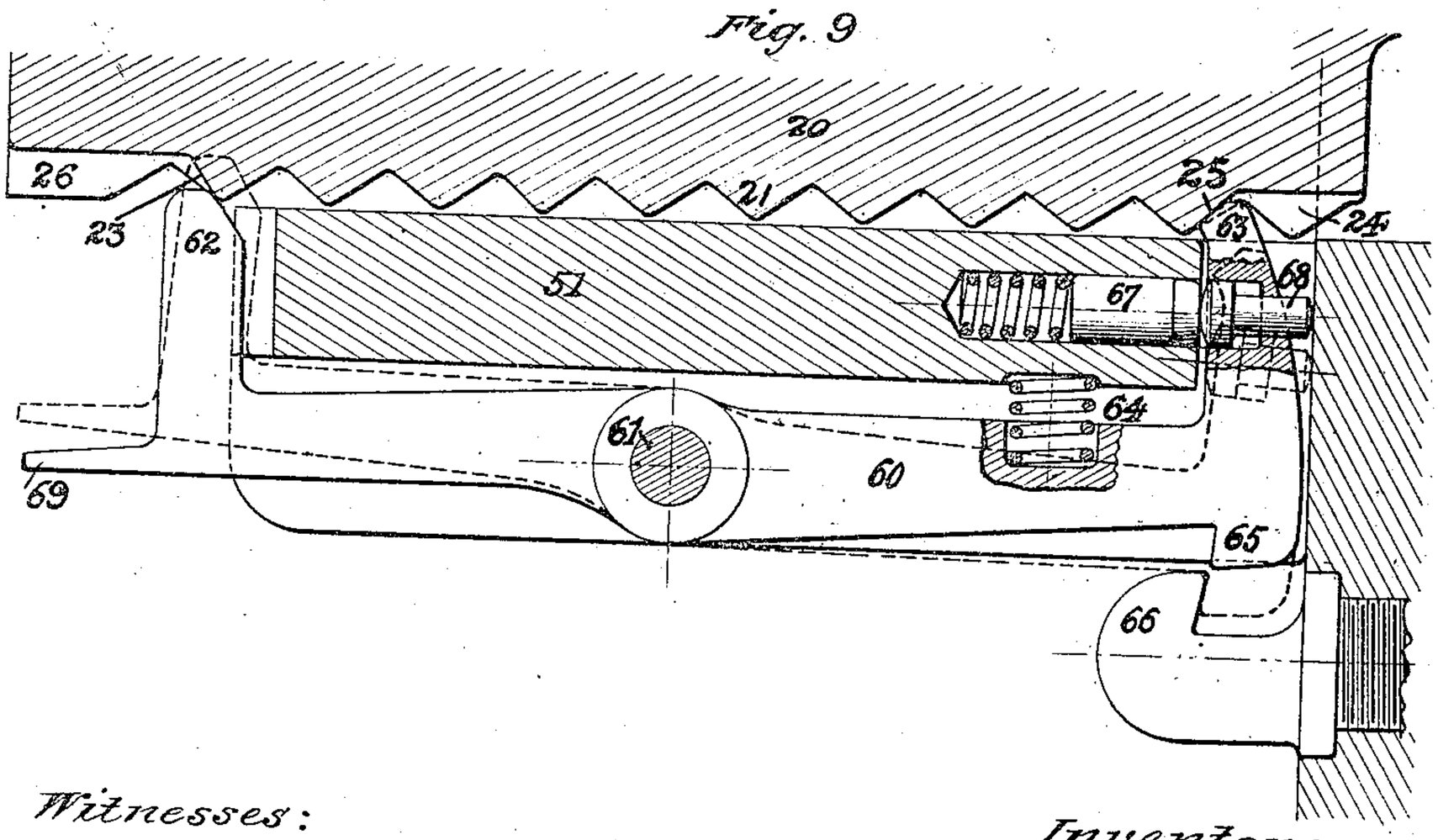


Fig. 9



Witnesses:
B. C. Tiffany
Edwin H. Lundy Jr.

Inventor:
John W. Stockett
by F. B. Brock Atty

UNITED STATES PATENT OFFICE.

JOHN W. STOCKETT, OF WASHINGTON, DISTRICT OF COLUMBIA.

ORDNANCE BREECH MECHANISM.

SPECIFICATION forming part of Letters Patent No. 601,176, dated March 22, 1898.

Application filed August 4, 1897. Serial No. 647,083. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. STOCKETT, of Washington, in the District of Columbia, have invented a new and useful Ordnance Breech-Operating Mechanism; and I do declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the letters and figures marked on the accompanying drawings, which form a part of this specification.

My invention relates to firearms and ordnance.

The improvements will be understood from the following description; and they consist in the combination and construction of the hereinafter-described devices, the details of which will be first fully set forth and the patentable features pointed out in the claims.

Figure 1 is a rear elevation of a gun to which my improvements have been applied. Fig. 2 is a central longitudinal section through line A B of Fig. 1 with parts in elevation and in dotted lines. Fig. 3 is a central longitudinal section through line C D of Fig. 1 with parts in elevation. Fig. 4 is a detail side elevation of the plug. Fig. 5 is a detail section thereof. Fig. 6 is a detail section of the plug and elevation of the operating-pinion. Fig. 7 is a detail section of the plug. Fig. 8 is a detail elevation and partial section of the operating-pinion, shaft, and worm. Fig. 9 is an enlarged detail section of the plug, gun, and tray-latch. Fig. 10 is a plan of the breech-plate. Fig. 11 is an edge elevation of the same, and Fig. 12 is a section of the same through the line M N of Figs. 10 and 11.

The breech-plug 20 is provided with a longitudinally-disposed translating-rack 1 upon the periphery of the plug and a transversely-arranged segmental rotating rack 2, virtually joining the outer end of the rack 1 at an angle approaching nearly that of a right angle. The length of the rack 1 is substantially that of the plug and the segmental rack about thirty degrees of the circumference thereof. These relative dimensions are illustrative merely. As a preferred construction both the racks are formed integral with the plug, but of course they may be separate and rigidly secured thereto.

The rotating rack 2 upon the line of its length is parallel with the threads 21 on the plug 20 for a purpose hereinafter referred to, and it has a stop 3 at one end and a stop 4 at the other, where the two racks 1 and 2 join.

5 is a web between the plug and rack 2 for strength and rigidity.

The rack-teeth of the rotating segmental rack are cut with curved working faces concentric with the axis of the pinion or gear 50 and the axis of the hinge upon which the tray swings, for a purpose also to be explained.

30 is the breech-plate, which supports the tray and its operating mechanism, together with the plug, during its linear translation out of and into the breech of the gun. It has bearings 31, which support the tray-bearings and the plug in all its movements. It has also a horizontal bearing 32, which receives the crank-shaft and its actuating mechanism. The peculiarity of this breech-plate is such that it is supported entirely by the jacket 40 in a built-up gun, and it has no connection with the hoops 41 or 42, the purpose of which will be hereinafter set forth. The breech-plate is peculiar and novel in connection with built-up guns.

The tray 51 is of the usual construction and is provided with rails or ribs 52, upon which the plug 20 slides and rests when upon the tray. It carries also a latch or lock mechanism, which will be described farther on. The hinge-pin or shaft 53, upon which the tray 51 swings, is mounted in the bearings 31 of the breech-plate 30, and it carries a worm-wheel 54, which meshes with the worm 55 on the operating-shaft 56, carried in suitable bearings in the jacket of the gun and the bearing 32 in the breech-plate. A crank 57 or other means serves to rotate the shaft.

The hinge-pin 53 carries the plug rotating and translating pinion 50. This pinion has worm or helical threads cut thereon, which threads are interrupted or mutilated by being cut away transversely at regular intervals, the sides of the cut-away portions forming a series of spur-teeth. The helical threads mesh with the rotating segmental rack 2, while the spur-teeth engage the longitudinal straight rack 1.

The plug 20 has grooves 22, adapted to fit upon the rails 52 of the tray, and it may be

provided with a gas-check and other suitable appurtenances. The threads 21 on the plug are interrupted in the usual way and are adapted to register and lock and unlock with threads on the gun-breech.

I provide an automatically-operating latch for locking the tray to the breech in the act of translating the plug and also to lock the plug upon the tray when the latter is swung away from the gun-breech and when the plug is fully withdrawn from the breech. This latch consists of a lever 60, pivoted in the tray at 61 within a recess in the under side of the tray.

62 is a bevel-jaw on the rear end of the latch-lever, and 63 is a bevel-jaw on the forward end of the latch, both jaws or projections being adapted to engage the plug under conditions which will be set forth.

64 is a spring normally depressing the front end of the latch-lever.

65 is a catch on the lower front end of the lever, and 66 a hook with which the catch engages when the front end of the latch is depressed.

67 is a spring-operated bolt located in a recess in the front end of the tray. Registering with this bolt when the inner end of the latch-lever is up and the plug fully withdrawn is a bolt or tappet 68, which has a limited longitudinal play in a hole and socket in the inner end of the latch-lever. The tappet 68 has, preferably, an enlarged rounded head, against which the bolt 67 bears.

When the catch 65 and hook 66 are in engagement, the head of tappet 68 still prevents the forward motion of bolt 67, as is shown by dotted lines in Fig. 9, as is also the case when the latch is in the position shown in full lines in the same figure. When, however, the tray 51 is swung away from the gun-breech upon the latch being released from the hook 66 by the movement of the plug upon the tray, (or upon being operated by hand by the handle 69,) then the inner end of tappet 68, no longer being forced outward by its contact with the gun-breech, is forced inwardly by the spring-bolt 67 and the bolt enters the tappet-socket in the latch, locking the latter securely in the position shown in full lines in Figs. 3 and 9. This last-named locking position of the latch will be maintained at all times when the tray is not in contact with the breech, nor can the handle 69 be operated in such position. When, however, the tray is swung back against the breech, the tappet 68 impinges thereon, and its contact with the wall of said breech shoves the tappet outwardly and ejects the bolt 67, whereupon the inward movement of the plug and the action of spring 64 causes the catch 65 to engage the hook 66 and lock the tray to the breech.

The plug 20 has a longitudinal slot or groove 26 open at the outer end and terminating in a bevel-face 23 at its inner end. A similar slot 24 is cut at the inner or opposite end of the plug, having also a bevel-face 25. The width of these slots 26 and 24 corresponds with and is slightly larger than the width of the latch-jaws 62 and 63.

Fig. 9 shows the plug at the full outward movement upon the tray locked thereon and the tray released from the breech. In such position the tray is ready to swing away from the breech or the plug pushed into the breech and the latch locked to the breech. In the latter movement of the plug upon the tray into the breech the bevel-face 23 of the slot 26 is moved inwardly away from its contact with the rear latch-jaw 62, permitting the latter to rise within the slot 26, and the spring 64 depresses the catch 65 into contact with the hook 66, the front jaw 63 dropping at the same time below the path of the plug.

The outward translation of the plug upon the tray takes place when the latch-lever is in the position shown by dotted lines, Fig. 9. No movement of the latch results until the bevel 23 of slot 26 engages the bevel-jaw 62 of the latch-lever, when the inner end thereof is thrown upwardly, tripping or releasing catch 65 and causing jaw 63 to enter and engage the bevel-face 25 of slot 24. This only occurs at the full outward movement of the plug upon the tray sufficient to swing it clear of the breech.

The relation of the rear jaw 62 and the front jaw 63 is such that the plug can never ride over the rear jaw, the engagement of the front jaw 63 with the plug preventing the depression of the rear jaw to such an extent as to prevent any movement of the plug. The movement of the plug upon the tray in either direction when the tray is swung away from the breech is prevented by the spring-bolt 67, which has already been described, both jaws of the latch being in engagement with the plug.

It has been stated that the center line of the rotating rack 2 on the plug 20 is disposed parallel with the interrupted threads 21 on said plug. As a result of this construction a serious jamming of the teeth of the rack 2 against those of the pinion 50 is avoided. When the breech-plug is rotated to release its threads with those of the breech, it moves backward, due to the pitch of the threads, and similarly it moves forward when being locked in the breech. When the line of the rotating segmental rack is perpendicular and not parallel with the threads of the breech and plug, the working conditions of the teeth on the plug and those on the pinion vary. At the beginning of the unlocking movement in such a case there is only a working clearance between the teeth on the rack and those on the pinion. As the plug moves backward during its rotation this working clearance is taken up and soon causes undue friction on the helical faces of the teeth and a harder working of the parts, necessitating the application of more power for translating the plug than is the case when my improved mechanism is used.

As has been described, the teeth of the rotating rack 2 are cut with curved faces, and these faces are concentric with the axis of the hinge 53 or pinion 50. A line-bearing is thus obtained between the teeth of the rack and pinion, which prevents a flat surface being worn on the helical faces of the teeth, which would be the result if the rack-teeth were cut straight.

It will be noticed that the fastenings of the breech-plate 30 (in this instance by bolts 33) to the gun-breech are confined wholly to the jacket 40 and that it is entirely disconnected from the hoops 41 and 42. This construction is an important one in built-up guns. These hoops move more or less upon each other and upon the jacket when the gun is in service, which firing causes the hoops to creep and momentarily release the internal strains in the metal, due to the method of manufacture. This independent movement of the hoops has actually caused a bending of both the hinge-pin and the pinion in service on guns in which these parts were in one way or another connected with the hoops. In my construction these hoops come and go without affecting in any degree the working of the breech mechanism, the mechanism being secured to the jacket 40 only.

As a result of my peculiar construction of rack 1 and pinion 50 two or more cog-faces of said pinion are brought to bear at all times upon the vertically-cut teeth of the rack 1 when the plug is being withdrawn or replaced and there is no tendency of its being pushed to one side and jammed. In other words, there is an even pull upon each side of the linear line of motion of the plug. By distributing the pull on two or more pinion-teeth also the tendency to wear or bur the pinion-teeth is greatly diminished. In most of the ordnance breech mechanisms in use there is a danger of the plug being pushed to one side during its translation, due to the power being applied to one side of the center of motion of the plug.

Where the withdrawing and rotating racks are formed separately from the plug and secured thereto, there is great danger of their being broken or distorted, rendering the gun useless in action. I have provided effectually against this danger by forming the plug and the racks of one piece of steel.

I claim—

1. In a gun, the combination of a threaded breech-block having a longitudinal rack thereon parallel with its axis and a segmental rack parallel with the screw-threads, with a worm-wheel having its threads interrupted transversely on a line parallel with the axis of the wheel, forming rack-teeth.

2. The combination of a plug, a tray and a locking-catch on the tray having jaws in locking engagement with cams on substantially opposite ends of the plug when the latter is fully withdrawn, substantially as described.

3. A breech-plug for guns having locking-threads upon its periphery and a rotating rack parallel with said locking-threads.

4. A breech-plug for guns having locking-threads upon its periphery, and a segmental tooth-rack upon its rear, the pitch-line of the segmental rack being parallel with the locking-threads.

5. The combination of a gun, a breech-plug having a segmental tooth-rack thereon, a pinion engaging the rack mounted upon the gun and means for operating the pinion, the working faces of the teeth of said rack and pinion being concentric with the axis of the hinge-pin.

6. The combination of a gun, a breech-plug, a breech-tray, a latch pivoted upon the tray and having a jaw at each end projecting upwardly through the tray into locking engagement with cam-surfaces substantially at the front and rear end of the plug, when the latter is fully withdrawn, substantially as described.

7. The combination in a built-up gun, a breech-plug therein, the ends of the sleeves of said gun, constituting the jacket and hoops, being substantially flush with each other, of a recess in said jacket and hoops, and a carrier-plate removably attached to said jacket and free from said hoops, the operating mechanism for said plug being supported on said plate and partially lying in said recess.

8. The combination of a gun, a breech-tray hinged thereto having a latch pivoted to the tray, said latch having a plurality of cammed projections and a lock for holding both cams in engagement with the breech-plug.

9. A threaded breech-plug for guns having a rotating rack formed integrally therewith and parallel with the locking-threads of the plug.

10. A threaded breech-plug for guns having a translating-rack and a rotating rack formed integrally therewith, the latter rack being parallel with the locking-threads on the plug.

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

JNO. W. STOCKETT.

Witnesses:
EDWARD K. DE PUY,
R. G. SUTTON.