

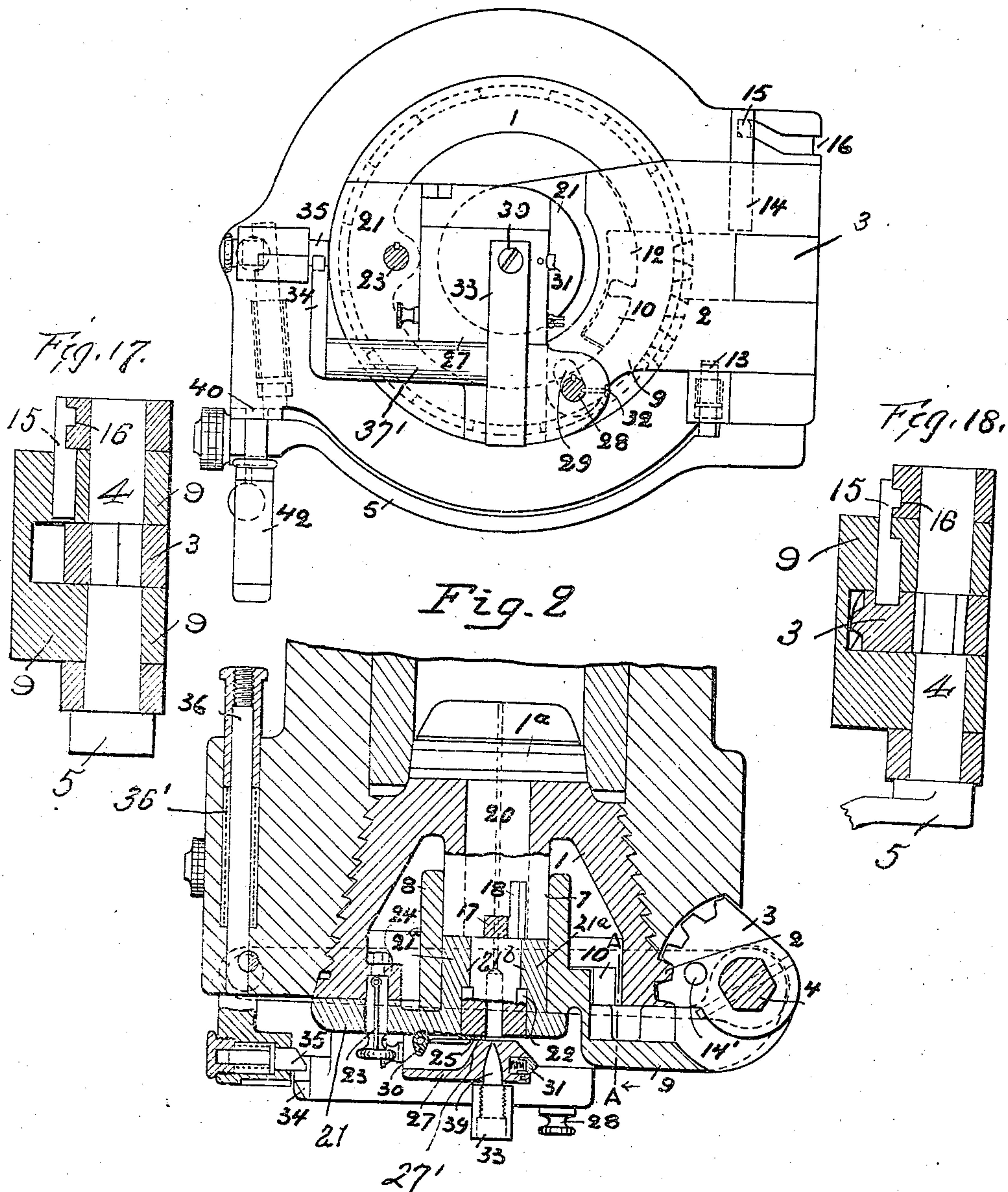
No. 843,504.

PATENTED FEB. 5, 1907.

H. T. J. THRONSEN.
BREECH LOADING MECHANISM.
APPLICATION FILED MAR. 17, 1906.

4 SHEETS—SHEET 1.

Fig. 1



Witnesses:

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4 SHEETS—SHEET 2.

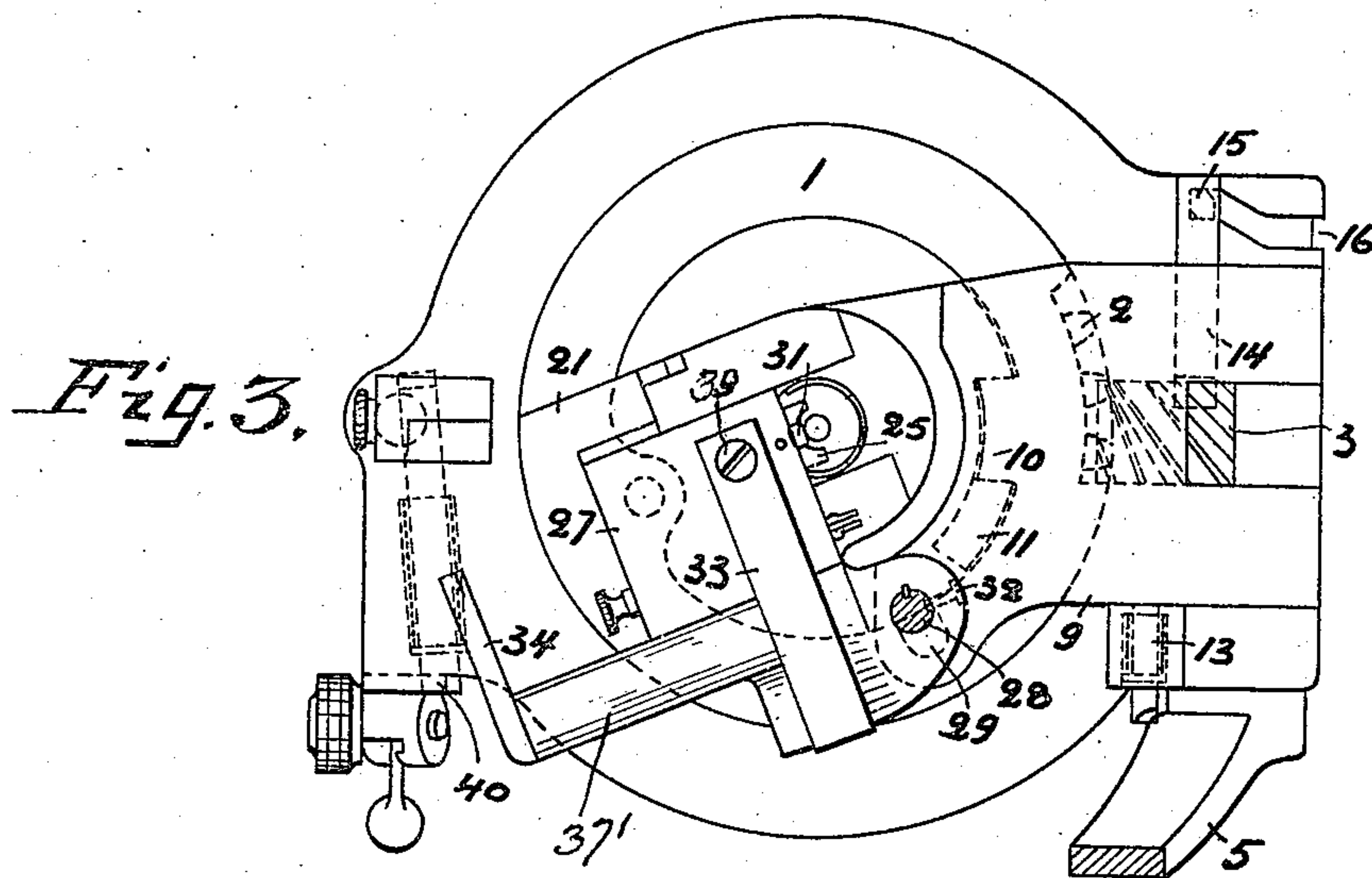
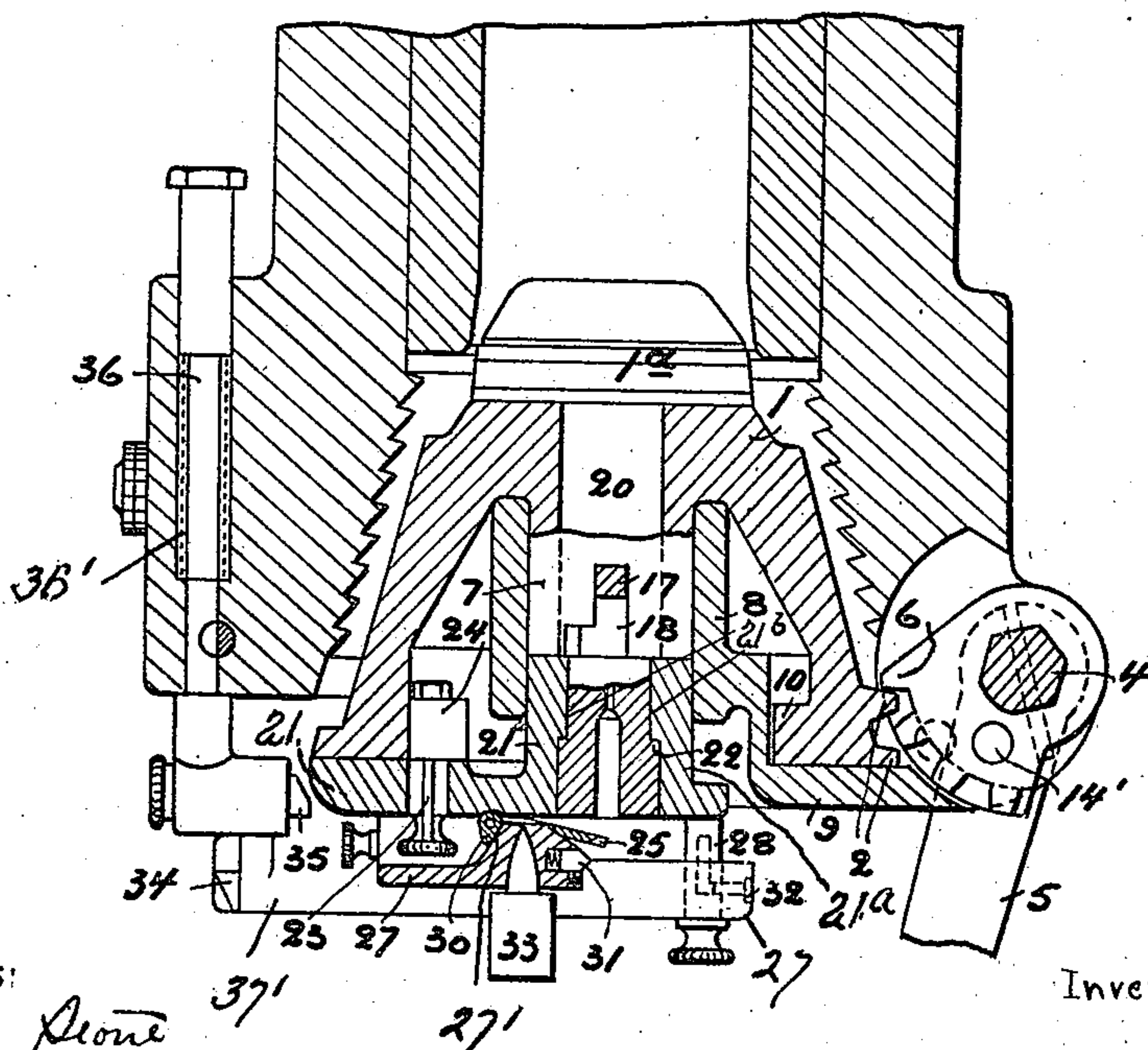


Fig. 4



Witnesses:

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No. 843,504.

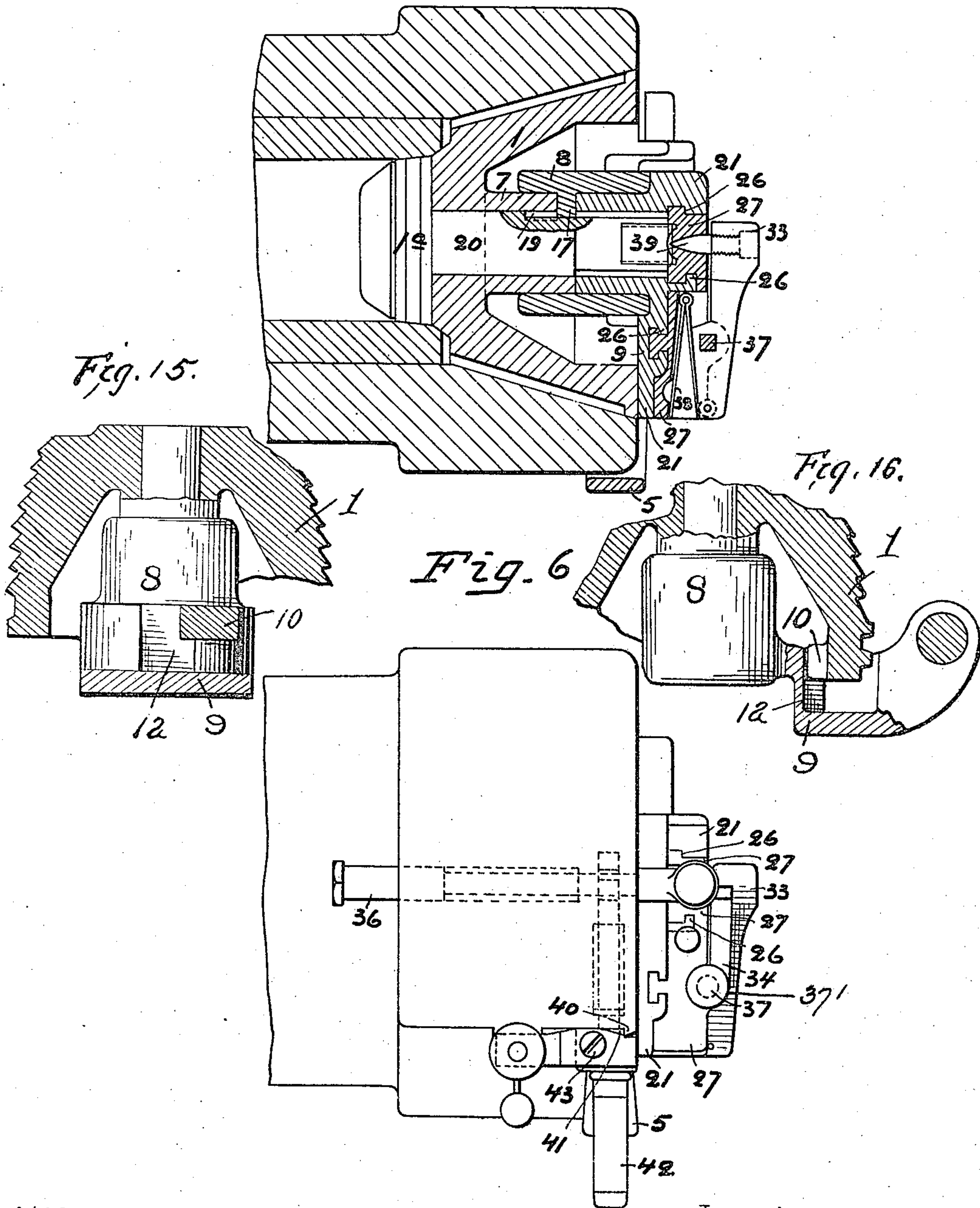
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4 SHEETS—SHEET 3.

Fig. 5



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4 SHEETS—SHEET 4.

Fig. 7

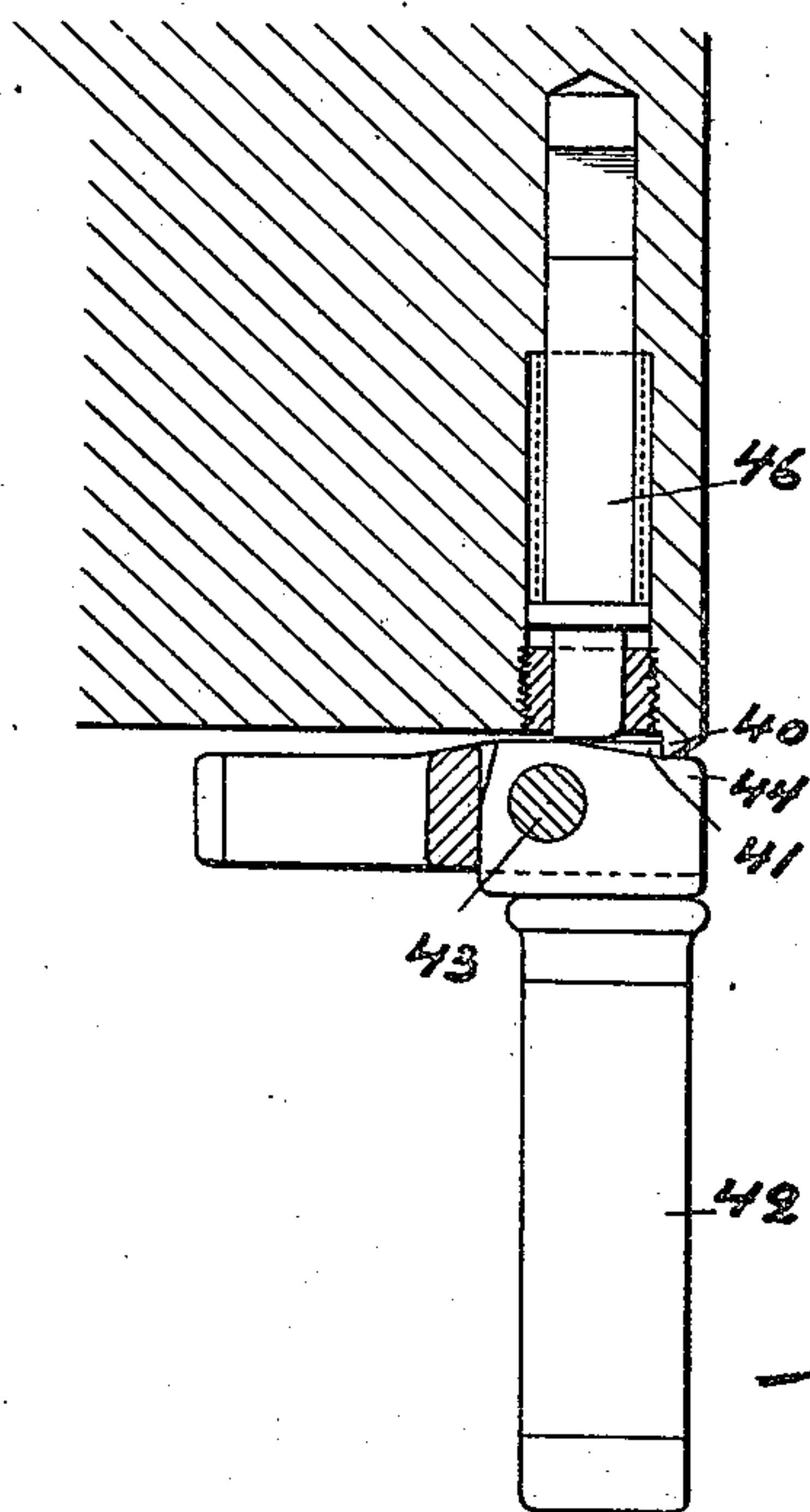


Fig. 8

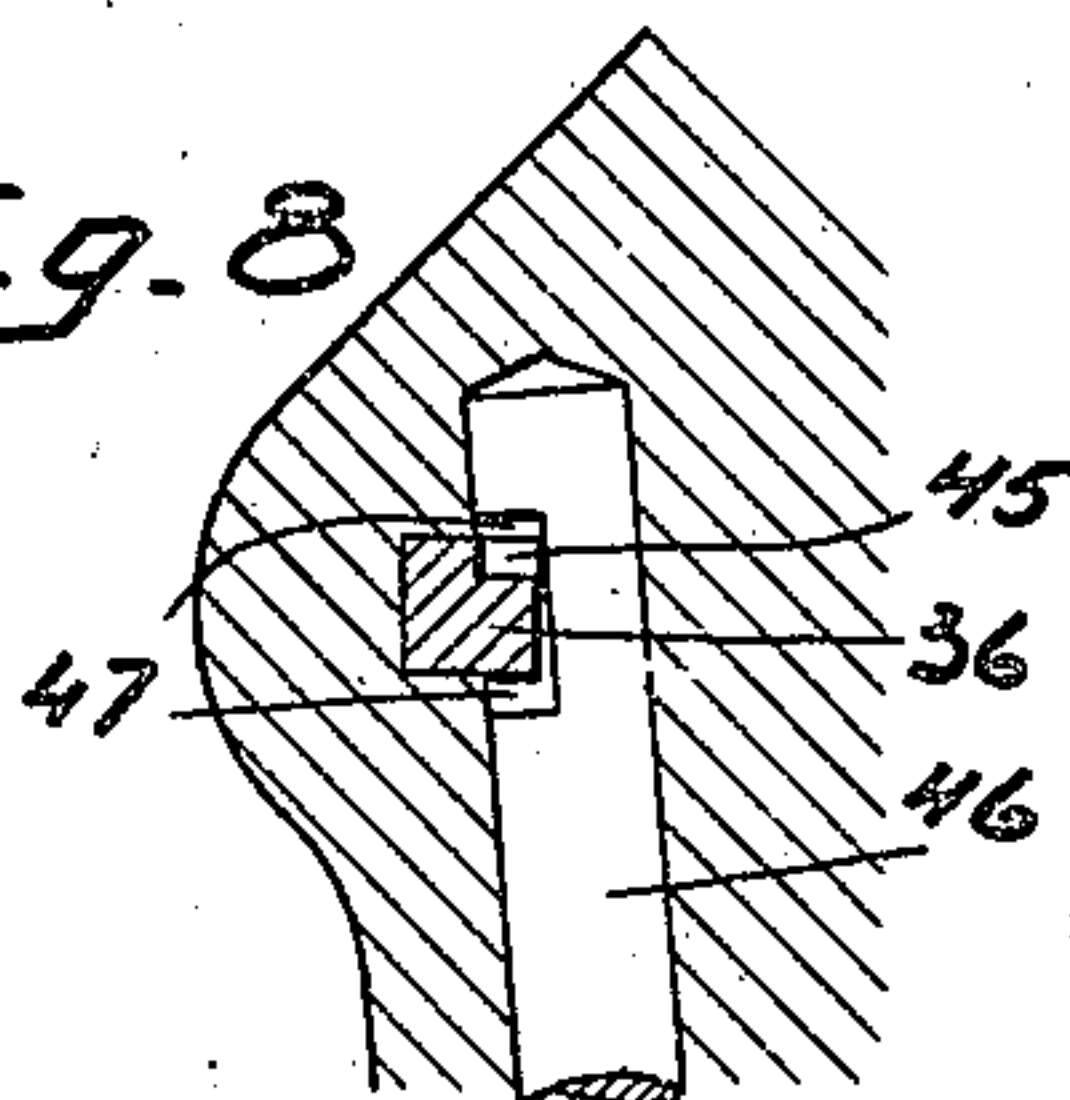


Fig. 9

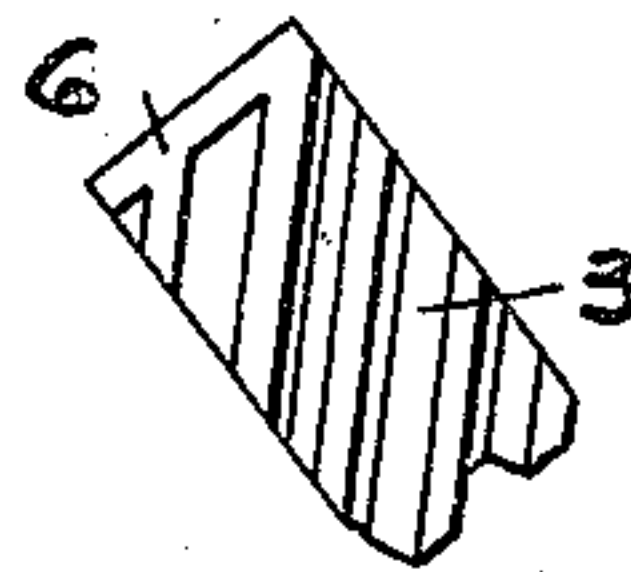


Fig. 10

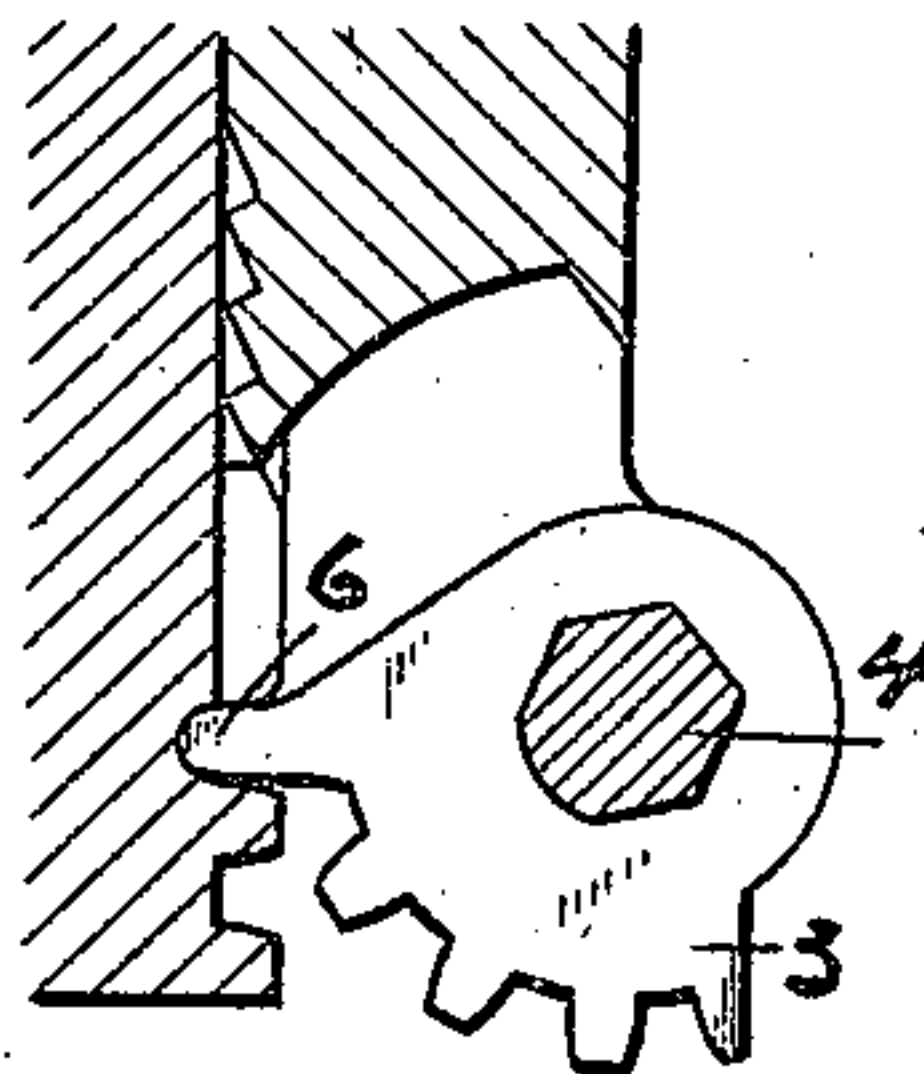


Fig. 11

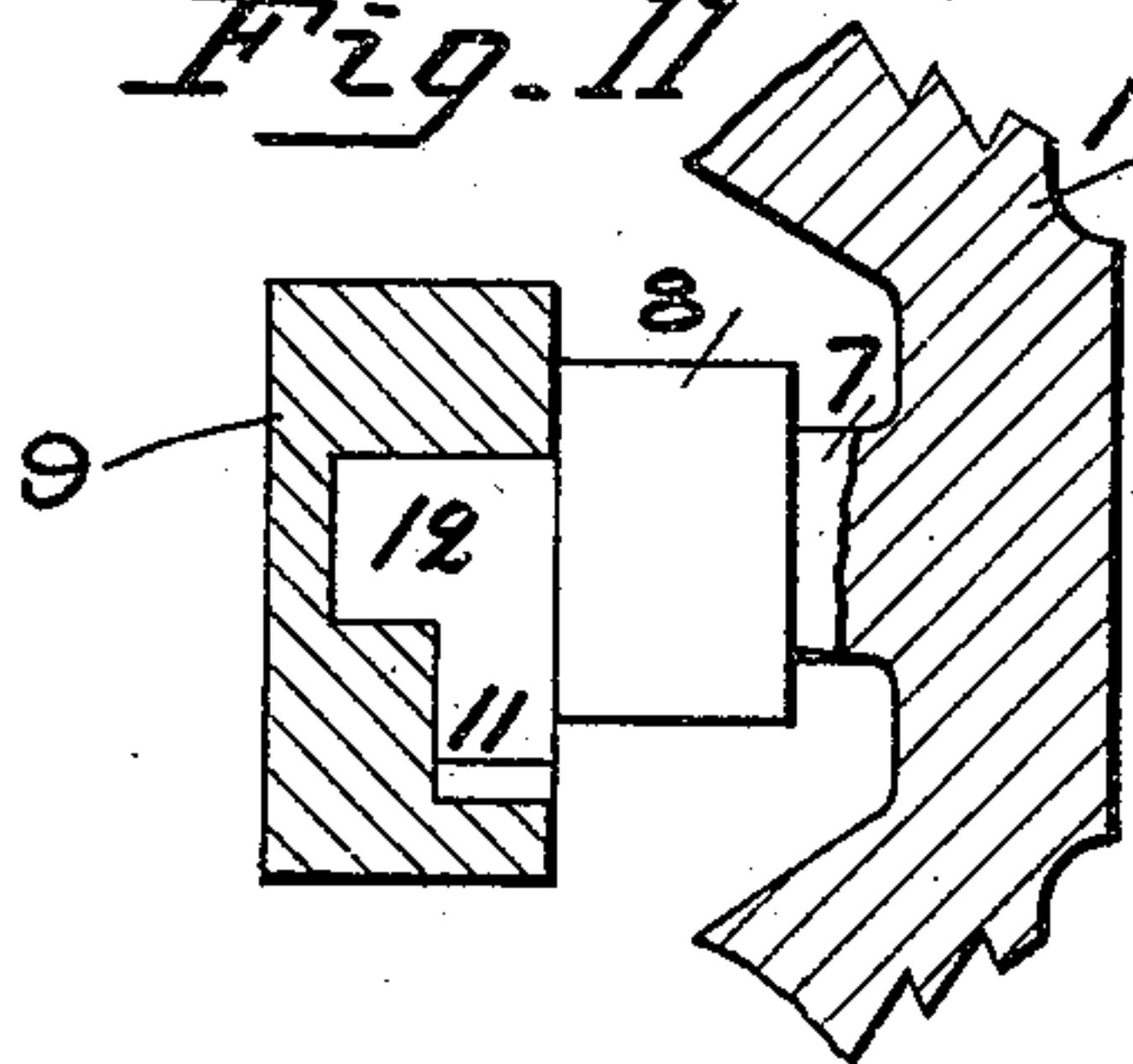


Fig. 13

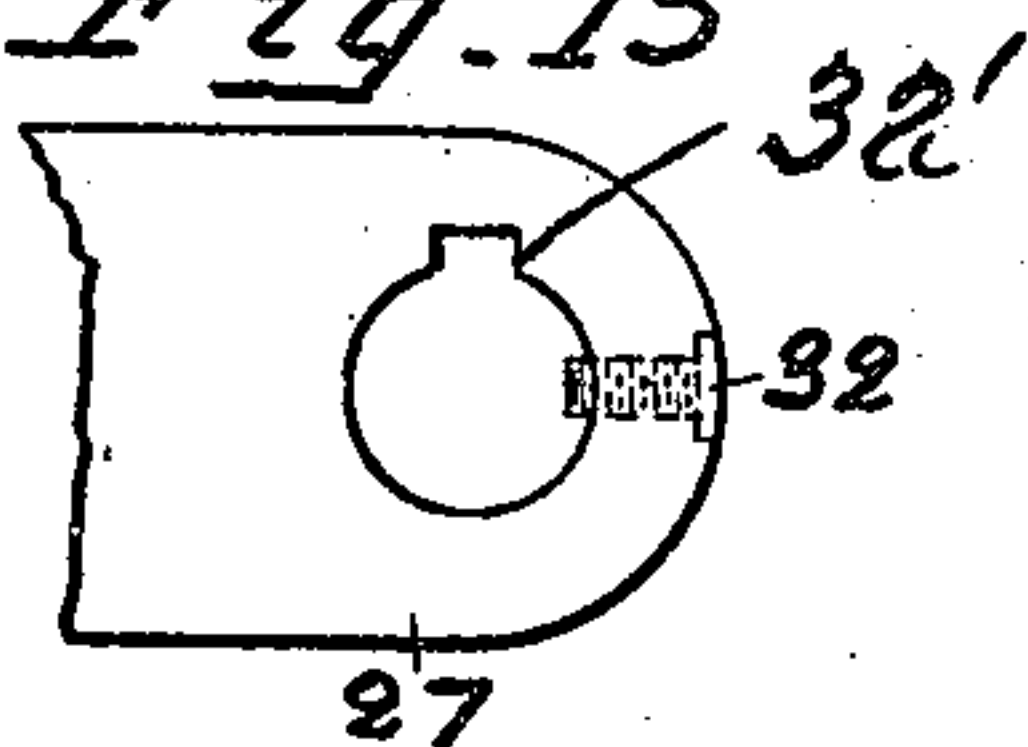


Fig. 12

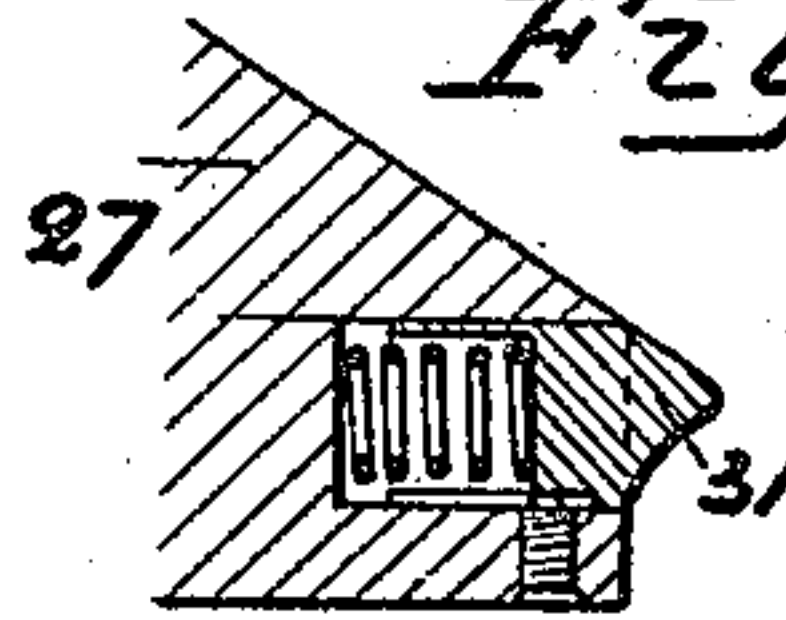
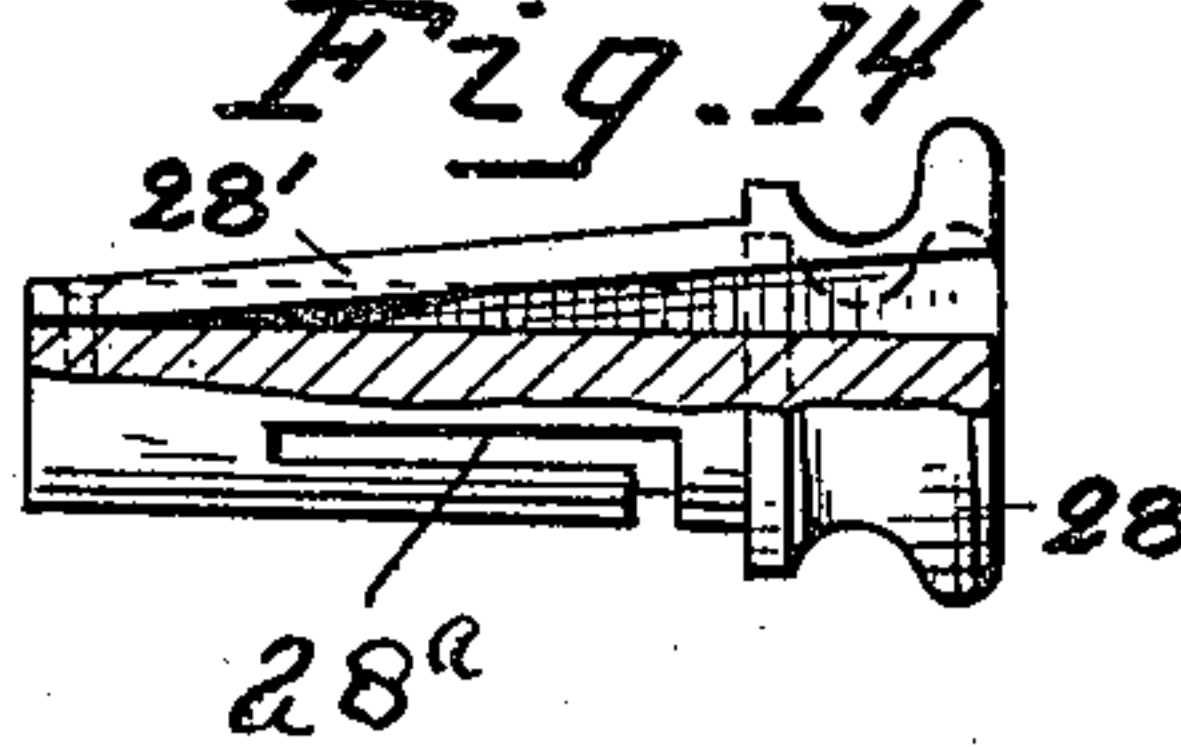


Fig. 14



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UNITED STATES PATENT OFFICE.

HARALD THORVALD JOHANNES THRONSEN, OF FINSPONG, SWEDEN, ASSIGNOR TO AKTIEBOLAGET NORDISKA ARTILLERWERKSTADERNA, OF FINSPONG, SWEDEN.

BREECH-LOADING MECHANISM.

No. 843,504.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed March 17, 1906. Serial No. 306,537.

To all whom it may concern:

Be it known that I, HARALD THORVALD JOHANNES THRONSEN, a subject of the King of Norway, and a resident of Finspong, in the Kingdom of Sweden, engineer, have invented certain new and useful Improvements in Breech-Loading Mechanisms, of which the following is a specification, reference being made to the accompanying drawings.

My invention relates to breech-loading mechanism designed to be completely opened and closed by a single movement of the hand or single movement of a hand-operated lever for effecting either the complete opening or closing movement.

The object of the invention is to provide a mechanism for subserving this object which is particularly simple in construction and highly efficient in operation.

The invention includes the combination and arrangement of parts to be hereinafter described, and particularly pointed out in the claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is an end elevation of a gun-breech having my invention embodied therein or applied thereto. Fig. 2 is a transverse sectional view of the same. Fig. 3 is a view similar to Fig. 1, showing the parts at the end of the first stage of the opening movement. Fig. 4 is a transverse sectional view of Fig. 3. Fig. 5 is a transverse sectional view taken at substantial right angles to Fig. 2. Fig. 6 is a detail side elevation of the breech end of the gun. Fig. 7 is a detail view of the mechanism for locking the operating-handle against accidental movement and for controlling the trigger-bolt. Fig. 8 is a detail view of part of the mechanism for controlling the trigger-bolt. Fig. 9 is a detail view of the sector. Fig. 10 is a detail view showing in side elevation a modified form of the sector. Fig. 11 is a detail view showing the slot in the carrier, which coacts with a lug on the breech-block. Fig. 12 is a detail view of the abutment for preventing the accidental ejection of the priming-shell. Figs. 13 and 14 are detail views of the pin for connecting the slide to the carrier and the opening which receives the pin. Figs.

15 and 16 are detail views of the breech-block and carrier, designed to illustrate the arrangement of coacting slot and lug associated with the carrier, and breech-block, respectively. Figs. 17 and 18 are detail views of the bolt for locking the carrier to the sector at the commencement of the closing movement.

In the illustrated embodiment of my invention the breech-block is designated 1 and is provided with sets of peripheral threads separated by spaces coacting with complementary sets of threads in the gun-breech separated by spaces. The breech-block is further provided near its rear end with a toothed segment 2, the teeth of which run obliquely, with which a toothed sector 3 coacts. This sector is fixed to an operating-spindle 4, mounted in the breech-block and carrying at one end an operating-arm 5, Figs. 1, 3, and 4.

In my improved mechanism when the parts are in firing position the threads on the breech-block are in engagement with the threads on the breech of the gun. In opening the breech-block the same is given three distinct movements—first, a turning movement about its axis for disengaging the coacting threads and bringing the sector-threads on one of the parts in register with or opposite the spaces on the other; secondly, a rearward axial movement, and then a final swinging movement. These three movements are all obtained by operating the arm 5. When the breech-block is turned sufficiently to disengage the threads thereof from the coacting threads on the breech, its rotary movement is checked and it is moved in consequence of the continued rotation of the toothed sector 3 straight backward until said block comes into such a position that it would not be hindered by the breech of the gun when it is swung backward around the spindle 4. In order that the straight backward or axial movement of the breech-block may take place with force, which is found necessary in order to release the obturator, (designated 1^a in the accompanying drawings,) the toothed sector 3 is provided along its front vertical edge with a presser in the shape of a tooth 6, which acts against the teeth of the segment 2.

If the breech-block is made of cylindrical shape rather than conical shape, as illustrated in the accompanying drawings, it is necessary in order that it may swing freely
 5 around the spindle 4 that it be moved farther backward than is provided by the mechanism illustrating the preferred form of my invention, and in such case the presser 6 on the toothed sector is extended beyond the
 10 teeth of the sector to enter a corresponding recess in the breech-block, as illustrated in Fig. 10 of the accompanying drawings. The breech-block is hollowed out and is provided with a cylindrical neck 7, axially disposed,
 15 which is surrounded by a collar 8, constituting a part of a carrier 9, which is rotatably mounted on the spindle 4.

The hammer (designated 33, Figs. 1, 5, and 6) is carried by a pin 37, which is journaled in a bearing 37', provided in a slide 27,
 20 guided in a plate 21, secured to the breech-block to turn therewith, said slide being shifted relative to the plate 21 during the first movement of the breech-block to operate
 25 shell-ejecting means carried by said plate 21.

The plate 21, Figs. 2 and 4, is provided with an inwardly-extending barrel 21^a, having a detachable connection to the end of the spindle 20, preferably by providing the parts
 30 with coacting shoulders and slots. The barrel 21^a is provided with diametrical opposed inwardly-extending ribs 21^b, designed in one position of the plate 21 to abut against co-
 35 acting ribs 22 on ends of the spindle 20 and in another position of said guide-plate to register with spaces or grooves separating said ribs 22. When the ribs 21^b register
 40 with said spaces, the guide-piece 21 may be shifted lengthwise of the spindle and removed from or placed thereupon; but when the ribs 21^b are turned out of register with
 45 said spaces the guide-piece is then held against movement lengthwise of the spindle. For retaining the guide piece or plate 21 against
 50 accidental turning on the spindle it is connected eccentrically of the axis of the spindle and breech-block to the latter by means of a bolt
 23, which engages a lug 24, projecting inwardly from the breech-block.

The slide 27, Figs. 1, 5, and 6, is secured to the plate 21 by tongue-and-groove connections 26 and carries a pin 28, which works
 55 within a slot 29 in the carrier 9, eccentric of the axis upon which the breech-block turns. This slide is provided with a shoulder 27',
 60 Figs. 2 and 4, which is located in the plane of a projection 30, extending radially from the pivot-pin of an ejector or shell-extractor 25,
 so that as the slide is shifted during the first movement of the breech-block it will strike
 65 said projections and throw the extractor 25 outwardly. This movement of the slide is due to the fact that the pin 28 and coacting slot 29 prevent it from moving with the plate
 21 during the turning of the breech-block,

but forces it to move relatively thereto in the direction of the length of the connections 26.

In order to prevent a fresh priming-cartridge which has been put into position from
 70 being ejected when the mechanism is closed rapidly, there is arranged in a recess in the slide 27 a movable tooth 31, acted upon by a spring, so as to tend to move outward, which
 75 tooth when a priming-cartridge is placed into position is pressed into the recess, but resumes its initial position as soon as the cartridge is seated, so that it forms an abutment
 80 to the rear of the shell. When the empty shell is thrown out by the extractor, it is done so vigorously that the tooth is pressed in
 85 against the tension of the spring, and the shell is thus permitted to pass.

If the cartridge misses fire, it is not necessary in the employment of this invention for
 85 the breech-block to be turned around its axis in order to change the cartridge; but the bolt 28 is made removable, so that the slide 27 can be independently shifted to one side. In
 90 this movement of the slide 27 the extractor is operated so as to eject the unserviceable cartridge, and thereafter a new one can be placed in position, whereupon the slide is moved
 95 back and the bolt 28 replaced. In the illustrated embodiment of the means for removably retaining the bolt 28 in place the latter
 100 is provided with an L-shaped slot 28^a, Fig. 14, with which coacts a screw 32, Fig. 13, which when the bolt is in position engages the circumferential part of the slot. To prevent
 105 the bolt from turning accidentally, it is provided with a spring 28', which normally interlocks with the walls of a channel 32', opening into the bolt-opening in the slide 27,
 110 Fig. 13. To remove the bolt from engagement with the carrier 9, the spring 28' is pressed inwardly to disengage the same from the wall of the channel 32' and the bolt
 115 turned to bring the lengthwise-extending part of the slot 28^a into register with screw 32, whereupon the bolt may be shifted axially.

A pin 37 is journaled in a bearing 37', provided on the slide 27, Figs. 1, 5, and 6, which
 120 carries at one end the hammer 33 and at its opposite end a laterally-extending arm 34, the free end of which is preferably beveled,
 125 Figs. 1 and 2. When the breech-block is closed and the firing-pin 39 in register with the axis thereof, the free end of arm 34 is in register with a spring-pressed trigger-piece 35,
 130 carried by the trigger-bolt 36, Figs. 1 and 2. Figs. 3 and 4 show parts in the second stage of the opening movement of the breech, and consequently, as here shown, the arm 34 is beyond
 135 the end of trigger-piece 35, as the slide 27 has been shifted to operate the ejector 25.

To cock and release the hammer 33, the part being in the position shown in Figs. 1, 2, and 3, the bolt 36 is pressed longitudinally
 140 against the tension of the spring 36', which

rocks the pin 37 through the intermediary of piece 35 and arm 34. The hammer 33 being fixed to arm 37 rocks therewith against the tension of the leaf-spring 38, interposed between the rear end thereof and the bottom of a channel or pocket provided in the slide 27, directly below the hammer, Fig. 5. This movement continues until the end of arm 34 slips out of engagement with trigger-piece 35, owing to the fact that the latter moves in a rectilinear line, while said end of arm 34 moves in an arc struck from pin 37. Immediately arm 34 releases itself from trigger-piece 35 the spring 38, which has been put under high tension during the shifting of the hammer 33, throws the rear end of the hammer outwardly and the front end thereof, carrying the firing-pin 39, back to its initial position and in sharp and vigorous engagement with the priming-cartridge, so that the latter is exploded.

My invention contemplates means for locking the arm 5 against accidental movement when the breech-block has been seated, and the illustrated embodiment of the means for accomplishing this purpose is a shoulder 40, Figs. 1 and 7, on the lower side of the breech of the gun, with which an edge 41 on arm 5 coacts. The shoulder 40 projects below the plane in which the part 41 travels in the swinging movement of the arm and is provided with a beveled face with which the part 41 coacts near the end of the closing movement of the arm 5. In the final closing movement the arm is sprung downwardly slightly by the shoulder until it passes in advance of the same, as shown in Fig. 7, whereupon the arm springs back and is locked behind the vertical flat face of the shoulder.

The arm 5 is preferably provided with a manipulating-handle 42, and in the illustrated embodiment of my invention this handle is arranged to disengage the arm from the shoulder 40. As shown herein, the handle 42 may be turned about a pin 43 and is provided at one end with a part 44, which when the mechanism is closed rests against the shoulder 40, Fig. 7. To open the mechanism, the handle is pulled backwardly in the direction of the arrow, Fig. 7, which by reason of the engagement of the part 44 with the shoulder serves to press the end of the arm 5 beneath said shoulder, thus forcing the arm below and back of the same, enabling it to be swung rearwardly, as hereinbefore described, to open the mechanism.

As it is important that the gun should not be discharged until the breech mechanism is completely closed, my invention contemplates means for locking the trigger-bolt against operation until the mechanism is so closed and the arm 5 locked in closed position by the shoulder 40. The illustrated means for accomplishing this object is shown as a locking-bolt 46, guided in the breech of the

gun in a direction at right angles to the trigger-bolt 36 and normally projected into a recess in the latter by a spring 46'. When the bolt 46 is thus in engagement with the trigger-bolt 36, the latter is prevented from partaking of any lengthwise movement.

The bolt 46 is provided with a recess 47, which when brought into register with the bolt 36 permits of the lengthwise movement of the latter in order that it may be operated to cock the hammer. One end of the bolt 46 projects from the breech of the gun directly in advance of the shoulder 40, so that when the arm 5 is brought forward and pressed beneath the shoulder 40 it will engage the bolt 46 and press the same inwardly against the tension of its spring, which brings the recess 47 into register with the trigger-bolt 36, so that then the latter is free to be operated.

In order to bring about the three distinct movements of the breech-block, (viz., the turning around the axis, the straight backward movement, and the backward and outward swinging movement,) the breech-block is provided with an inwardly-extending lug 10, which coacts with an angular slot in the carrier 9. One part of the slot (designated 12) extends in a direction parallel with the axis of the breech-block, and the other part (designated 11) extends laterally from the rear or bottom of part 12 and is of approximately one-half the depth of the latter. When the breech-block is closed—i. e., when the threads of the breech-block are in full engagement with the threads of the breech of the gun-barrel, Figs. 1 and 2—lug 10 then lies in the part of the laterally-extending portion 11 of the slot most remote from portion 12. During the turning of the breech-block in consequence of the backward swinging of the arm 5 the lug 10 travels toward the part 12 of the angular slot until it finally abuts against the wall of said part 12 most remote from the part 11, which arrests the further turning of the breech-block, and in this position of the parts the lug 10 is in full register with the part 12 of the slot. The continued pressure of the teeth of the sector on the teeth of the segment now serves to move the breech-block straight backward, and during this movement the lug 10 moves lengthwise in the part 12 of the angular slot. When the breech-block reaches a position in its direct rearward movement that enables it to swing freely backward and outward around the spindle 5, the breech-block comes into contact with the front part of the cylinder 8 and the independent movement of the two parts is arrested. Until the breech-block reaches the position last mentioned the carrier 9 has been locked to the breech of the gun-barrel by a bolt 13, guided in the breech of the gun, which bolt is held into engagement with the carrier by a surface on the arm 5 against the tension of a spring which tends to force the pin out of en-

gagement with the carrier. The part on the arm 5 which coacts with the pin is so disposed that it passes out of engagement with the pin 13 at the moment the breech-block is arrested by the cylinder 8, and in the further turning of the spindle 4 the breech-block and carrier move together, so that the carrier 9, with the breech-block, swings backwardly and outwardly, the toothed segment of the breech-block being still acted upon by the toothed sector which is being rotated by the arm 5.

In order that the carrier may move with the breech-block when the latter is swung back to close the mechanism, there is arranged in one of the hinged parts of the carrier a bolt 14, which coacts with an opening 14' in the toothed sector 3. The bolt 14 is provided with a lug 15, coacting with a slot 16 in the periphery of one of the ears, forming a part of the breech of the gun and constituting a bearing for the spindle 4. This slot 16 is of such shape that the bolt 14 in consequence of the engagement of the lug 15 therein will be forced at the desired point in the swinging movement of the carrier 9 into the opening 14'. By this mechanism the carrier 9 is locked to the sector during the first stage of the closing movement of the parts and is unlocked from the sector, so that the same will move independently of the carrier in its movement for shifting the breech-block in a direct axial line and for rotating the breech-block about its axis for screwing the same home, or in the two final closing movements.

The bolt 13 might be arranged to be shifted in a similar manner to the bolt 14, and for the sake of clearness the two bolts are shown as arranged on opposite sides of the hinged parts of the carrier; but of course the bolts might be arranged on the same side of the hinged part, and as they act immediately after each other they might be arranged in the form of a single part.

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

1. In combination, in a breech-loading mechanism, a breech-block having a turning movement about its axis, a second movement lengthwise of its axis and a swinging movement, a guide member having a detachable connection to the breech-block, a slide associated with the guide member capable of movement manually when the breech-block is at rest and movable automatically during the turning movement of the breech-block, an extractor pivoted to the guide having an operating part projecting into the path of movement of the slide, and a spring-pressed retaining-tooth carried by the slide and having a part normally in register with the cartridge-seat, substantially as described.

2. The combination, in a breech-loading

mechanism, a breech-block having a turning movement about its axis, a second movement lengthwise of its axis, and a swinging movement, a toothed segment coacting with the breech-block, and an arm for rocking the segment, a carrier for the breech-block, means controlled by the arm for retaining the carrier against movement during the first two movements of the breech-block whereby the carrier will move with the segment, during the third movement only, substantially as described.

3. The combination, in a breech-loading mechanism, the breech-block having a turning movement about its axis, a second movement lengthwise of its axis, a toothed segment coacting with the breech-block for imparting movement thereto, an arm for rocking the segment, a carrier for the breech-block, a guide member, a slide movable relatively thereto, a hammer pivotally mounted on the slide, a spring for tensioning the hammer, means for cocking the hammer comprising a trigger-bolt, slidably mounted in the breech of the gun, a spring-pressed trigger-piece carried thereby and an arm movable with the hammer and coacting with said spring-pressed trigger-piece, substantially as described.

4. The combination, in a breech-loading mechanism, a breech-block having a turning movement about its axis, a second movement lengthwise of its axis and a swinging movement, a toothed segment coacting with the breech-block for imparting movement thereto, an arm for rocking the segment, a carrier for the breech-block, a guide member, a slide movable relatively thereto, a hammer pivotally mounted on the slide, a spring for tensioning the hammer and means for cocking the hammer comprising a lengthwise-movable trigger-bolt slidably mounted in the breech of the gun, and means for controlling the latter comprising an abutment on the trigger-bolt, a second bolt having a surface normally in engagement with the abutment and means for shifting the second bolt, to disengage said surface from the abutment, controlled by the arm which rotates the segment, substantially as described.

5. In combination, a breech-loading mechanism, a breech-block, having a turning movement about its axis, a second movement lengthwise of its axis and a swinging movement, said breech-block having an axially-disposed stem, a segment, a spindle carrying the same pivotally mounted in the breech of the gun, an arm 5 secured to the spindle for rocking the same, coacting gears on the segment and breech-block, a carrier mounted on said spindle having a tubular portion engaging the stem of the breech-block, coacting means on the carrier and breech-block for limiting the turning movement of the latter, a guide member, a slide associated with the guide member, an ex-

tractor secured to the guide and operated by the slide, a connection between the slide and breech-block for shifting the slide during the turning movement of the breech-block, a
 5 hammer secured to the slide, a trigger-bolt guided in the breech of the gun, means controlled by the arm 5 for controlling the movement of the trigger-bolt, and means also controlled by the arm 5 for retaining the carrier
 10 against movement during the first two movements of the breech-block, substantially as described.

6. In combination, a breech-loading mechanism a breech-block having a turning movement about its axis, a second movement
 15 lengthwise of its axis and a swinging movement, said breech-block having an axially-disposed stem, a segment, a spindle carrying the same pivotally mounted in the breech of
 20 the gun, an arm 5 secured to the spindle for rocking the same, coacting gears on the segment and breech-block, a carrier mounted on said spindle having a tubular portion engaging the stem of the breech-block, coacting
 25 means on the carrier and breech-block for limiting the turning movement of the latter, a guide member, a slide associated with the guide member, an extractor secured to the guide and operated by the slide, a connection
 30 between the slide and breech-block for shifting the slide during the turning movement

of the breech-block, a hammer secured to the slide, a trigger-bolt guided in the breech of the gun, means controlled by the arm 5
 35 for controlling the movement of the trigger-bolt, means also controlled by the arm 5 for retaining the carrier against movement during the first two movements of the breech-block, and means for locking the carrier to
 40 the segment during the first stage of the closing movement of the breech-block, substantially as described.

7. In combination, in a breech-loading mechanism, a breech-block having a turning movement about its axis, a second movement
 45 lengthwise of its axis and a swinging movement, a guide member having a detachable connection to the breech-block, a slide associated with the guide capable of movement independently of the breech-block,
 50 means for shifting the slide during the turning movement of the breech-block and an extractor having an operating part projecting into the path of the movement of the
 55 slide, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HARALD THORVALD JOHANNES THRONSEN.

Witnesses:

GUSTAF B. SÖDERLUND,
 CARL FREDR. BORG.