

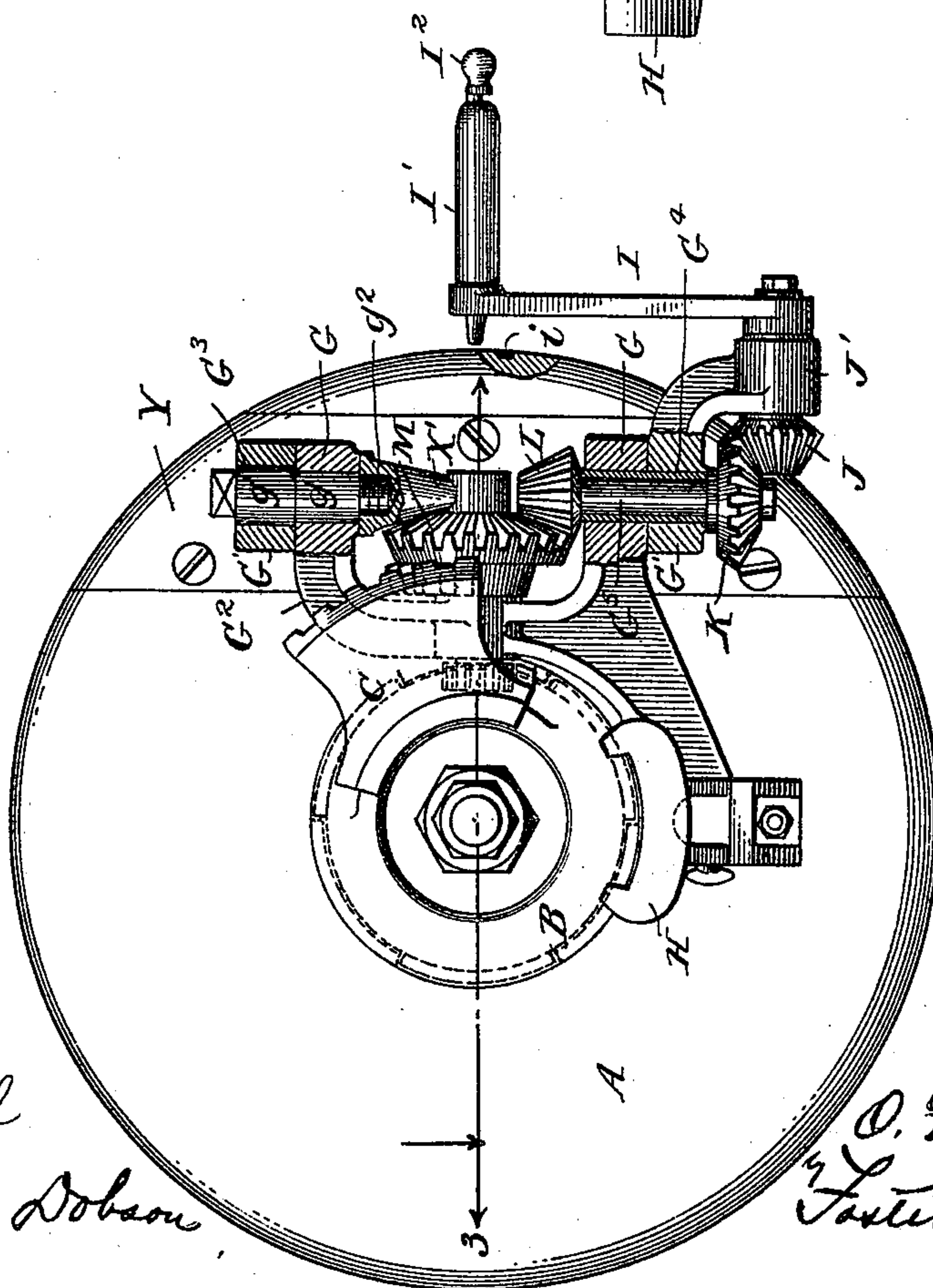
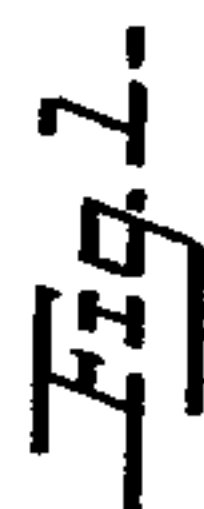
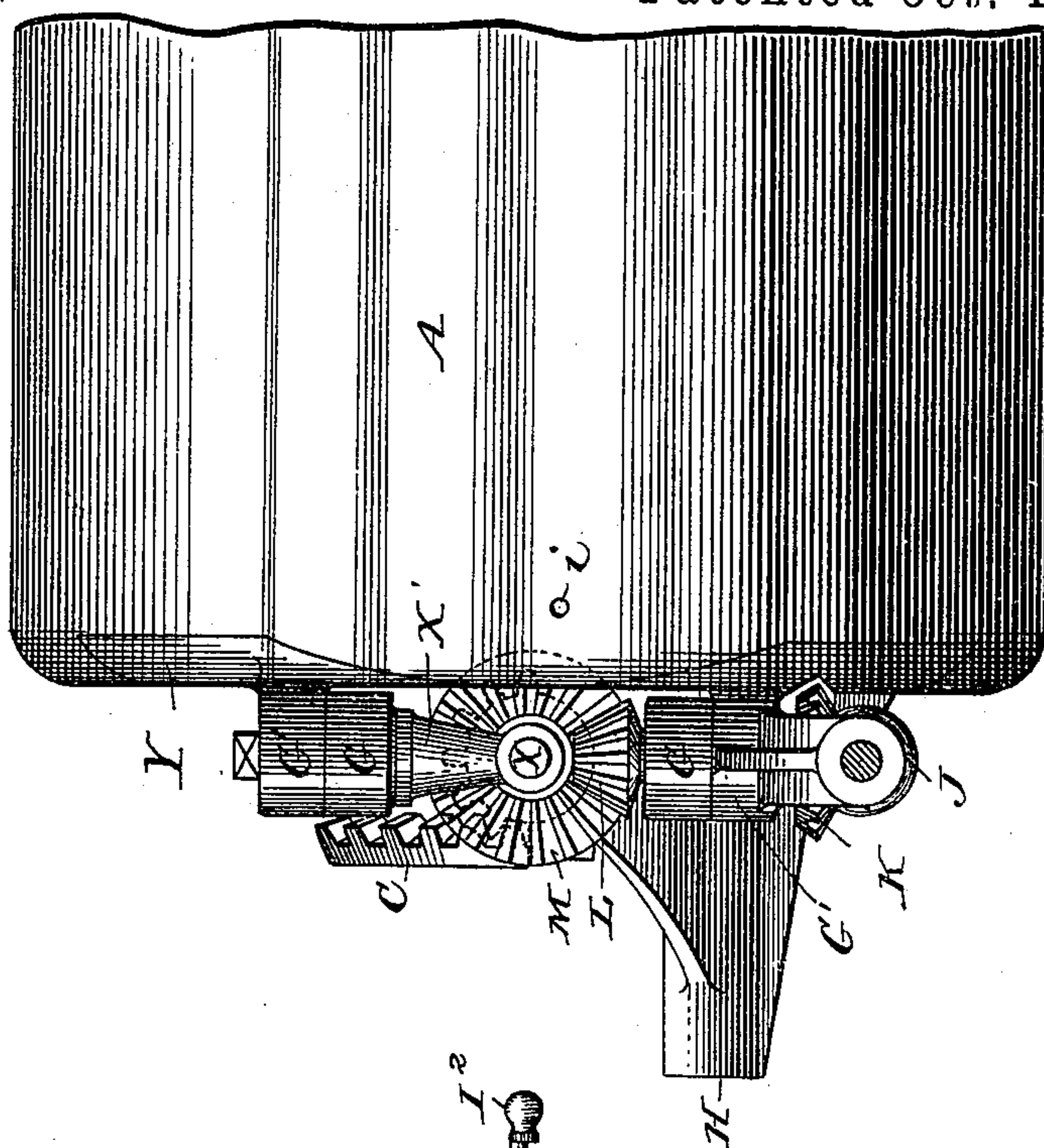
(No Model.)

3 Sheets—Sheet 1.

O. F. LEIBERT.
BREECH MECHANISM FOR ORDNANCE.

No. 547,791.

Patented Oct. 15, 1895.



Witnesses
J. G. Hinkel
and A. Dobson

Inventor
O. F. Leibert
by
Foster Freeman
Attorneys

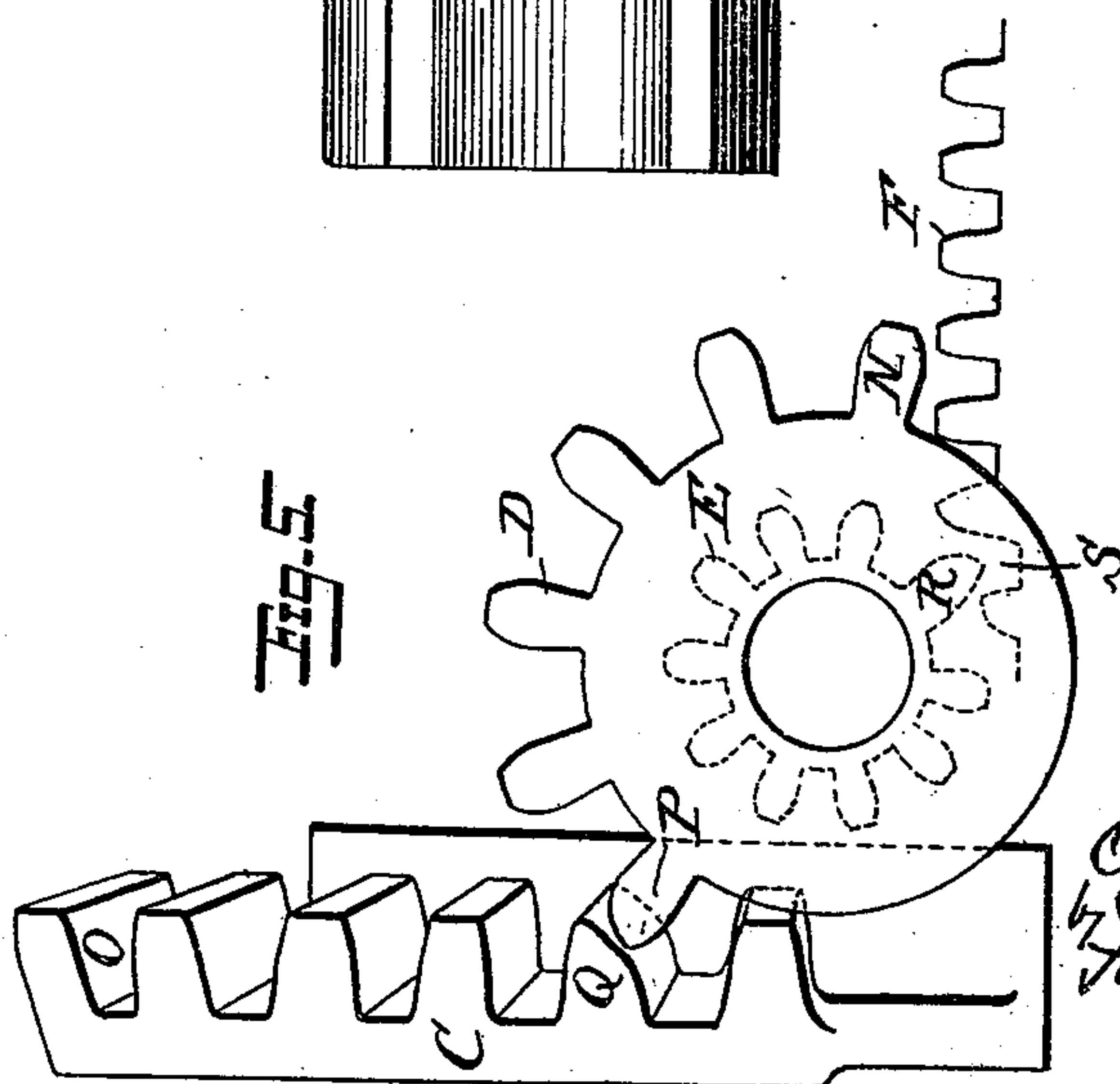
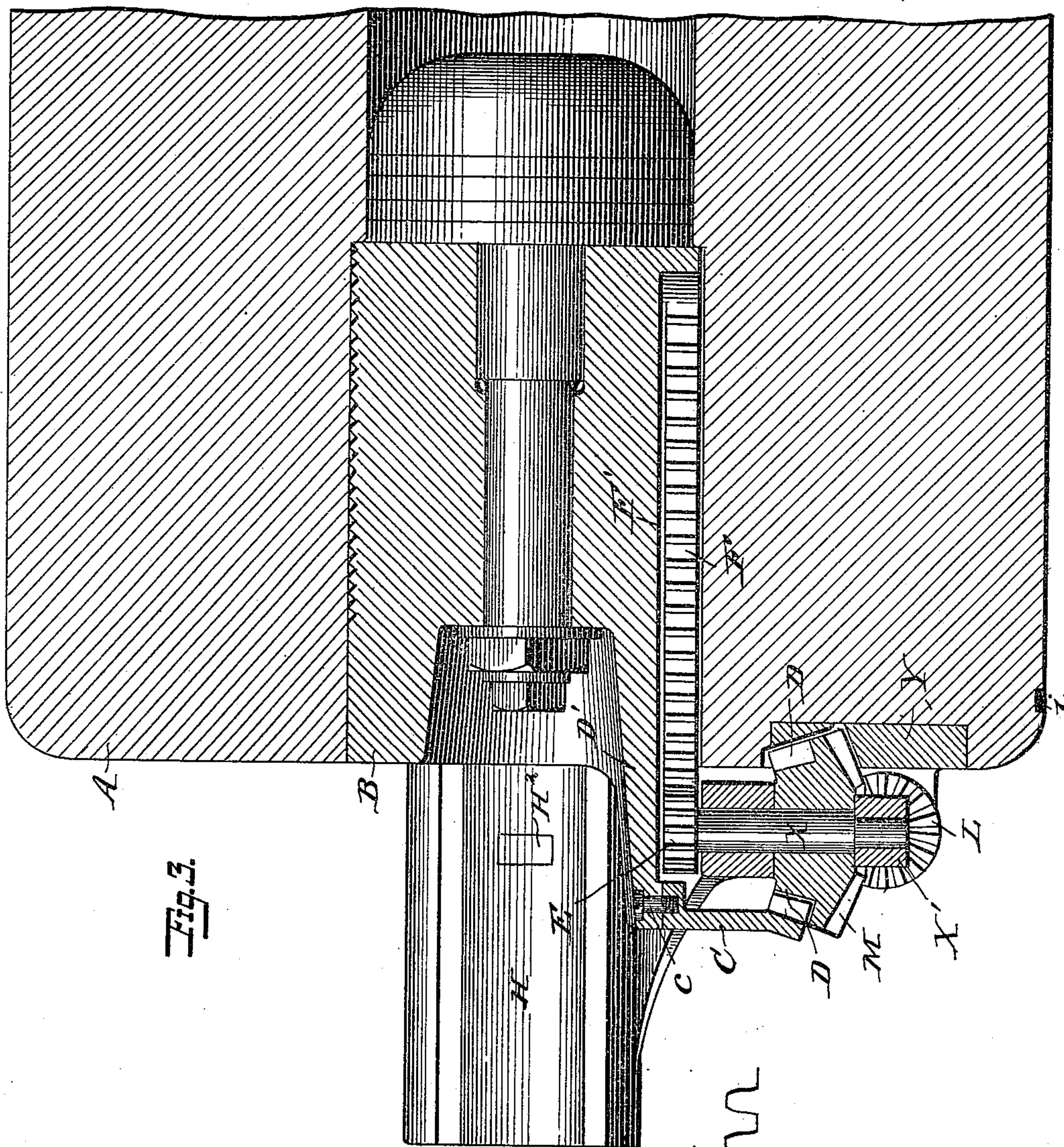
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3 Sheets—Sheet 2.

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Witnesses
J. G. Hinkel
and
A. N. Dobson

Inventor
O. F. Leibert
by *[Signature]*
Foster Newman
Attorneys

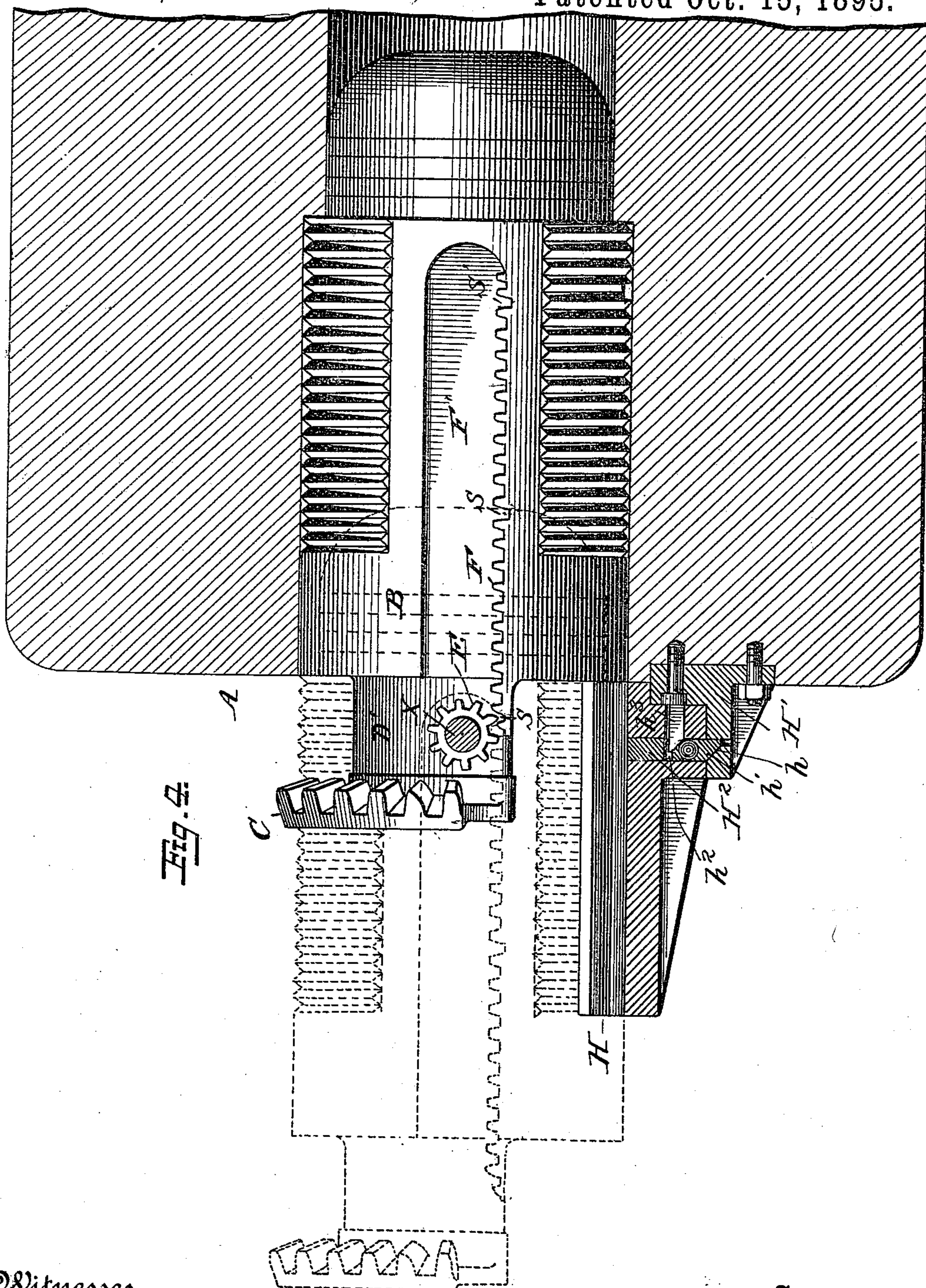
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3 Sheets—Sheet 3.

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Witnesses
J. G. Hinkel
acc. K. Dobson

Inventor
O. F. Leibert.
John H. Heman
Attorneys

UNITED STATES PATENT OFFICE.

OWEN FRANKLIN LEIBERT, OF BETHLEHEM, PENNSYLVANIA.

BREECH MECHANISM FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 547,791, dated October 15, 1895.

Application filed May 19, 1894. Serial No. 511,853. (No model.)

To all whom it may concern:

Be it known that I, OWEN FRANKLIN LEIBERT, a citizen of the United States, residing at Bethlehem, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Breech Mechanism, of which the following is a specification.

My invention relates to breech mechanism for guns, and more particularly to that class of breech mechanism wherein the breech block or plug is unlocked, withdrawn, and swung to one side away from the breech of the gun by a continuously-operating mechanism, and whereby the breech block or plug is swung into position before the breech, inserted therein, and locked, also, with one continuous motion of the mechanism; and it has for its object to improve the construction and arrangement of such breech-operating mechanism, whereby the breech block or plug can be more quickly, easily, and certainly operated by means which are substantial in structure, positive in operation, and mechanically simple of construction for carrying out the three movements by a continuous operation or turning of the crank or similar device; and to these ends my invention consists in the various features of construction and arrangement of parts adapted to operate substantially in the manner hereinafter set forth.

Referring to the accompanying drawings, Figure 1 is an end view of a gun, showing the breech mechanism in an unlocked position for convenience of illustration. Fig. 2 is a side view of a portion of a gun, showing the breech mechanism in the position shown in Fig. 1. Fig. 3 is a longitudinal section on the line 3 3, Fig. 1. Fig. 4 is a part sectional view showing the plug and segmental rack in side view. Fig. 5 is a detail view showing the arrangement of the segmental gears, rack, and pinion for operating the breech-block.

My invention is designed more especially for breech mechanism for heavy ordnance, although, of course, it may be applied to guns of various sizes and styles, and while it is not broadly new to provide breech mechanism which will unlock, withdraw, and swing the breech-block to one side by a continuous movement it is the object of my present invention to improve upon the construction

and arrangement of these means and provide a breech-block-operating mechanism which shall meet all the requirements of devices of this character to-day.

The breech block or plug is usually locked in the breech of the gun by means of interrupted screw-threads, and I have shown my invention as applied to a gun of such construction, and it is understood that in order to remove the breech-block from the breech of the gun it is first necessary to rotate the block a certain distance in order that the interrupted screw-threads on the block and in the breech may become disengaged, and then the block may be withdrawn longitudinally from the breech.

With this general statement of the purposes and objects of my invention I will now proceed to describe in detail the construction and arrangement of the embodiment thereof shown in the accompanying drawings, and it will be understood that my invention is not limited to the precise details of the construction set forth, as these may be varied by those skilled in the art without departing from the essential features of my invention, and that parts of my invention may be used in combination with each other or with equivalent constructions without departing from the spirit thereof.

In the breech A of the gun, which may be of any suitable construction, is the usual breech or opening provided with interrupted threads for the reception of the removable breech-block B, which is provided with correspondingly-interrupted threads, whereby the breech-block may be inserted and partially rotated to secure it in the breech of the gun in the usual manner.

Connected to the exterior of the breech-block is a segmental gear C, and this may be connected to the block in any desirable way, it being shown in Fig. 3 as connected by a screw to a segmental rearward extension D' of the block, and this segment is utilized for rotating the block in the breech for locking or unlocking the block from the breech of the gun. The gear-teeth of this segment are shown herein in the form of a beveled gear-segment, and co-operating with these teeth are the beveled teeth of the segmental gear D. The side of the breech-block between two

portions of the segmental locking-teeth is cut away or formed with a recess F' , on one side of which is arranged a rack or series of teeth F , cut into the breech-block or secured thereto as desired, and engaging this rack is a spur-pinion gearing E and this spur-pinion gearing and rack co-operate to withdraw the breech-block from the breech of the gun or to insert it therein, as the case may be.

Secured to the end of the breech of the gun are the lugs $G' G'$, which form portions of hinges, the other portions $G G$ being connected to a yoke-piece G^2 , the lower end of which is extended to support the tray H , and this yoke-piece swings in the manner herein-after described to carry the breech-block away from and bring it to the breech, and the center of the yoke-piece is shown as forming a bearing for a short shaft X , on which shaft are mounted the bevel gear-segment D and the spur-pinion gearing E . The pintle or king-pin of the upper portion of the hinge may be extended downward and form a bearing-piece X' for the outer end of the short shaft X , so that it will be supported against any tendency to distortion in operating the same; but I prefer to make the upper pintle or king-pin G^3 in the form shown in Fig. 1, having an enlarged portion g' , forming a bearing in the lug G' , and a somewhat reduced portion g , forming the bearing in the portion G of the hinge, and the end also further reduced, as at g^2 , and screw-threaded to enter a screw-threaded socket in the bearing-piece X' , and in this way the bearing-piece can be clamped securely to the hinge portion G of the yoke. I have shown the segmental bevel-gear D as arranged on the short shaft X between this bearing X' and the yoke-piece G^2 , while the spur-pinion gearing E is arranged inside the yoke-piece, and it will be seen that this forms an exceedingly simple yet strong and durable arrangement of parts, and while I deem it the preferable arrangement any other equivalent means of mounting the bevel gear-segment and the spur-pinion gearing may be employed.

In order to rotate the bevel gear-segment and the spur-pinion in the present instance, I have shown mounted on the short shaft X a bevel-gear M between the bearing-piece X' and the segmental bevel-gear D , and I utilize the pintle or king-pin of the lower portion of the hinge to support the driving-gear. I preferably provide a hollow pintle or bearing G^4 for this portion of the hinge, and mounted in this hollow bearing is a king-pin or shaft G^5 , carrying on its upper end a bevel-pinion L , engaging the bevel gear-wheel M to rotate the short shaft X and connect the gears. This short shaft may be rotated by any suitable means, and I have shown a bevel-gear K , secured to the exterior end of the king-pin or shaft. This construction provides for the removal of the king-pin or shaft without disturbing the yoke, as the hollow pintle or bushing will support the yoke in position, and the

parts can be removed and adjusted in case of any lost motion or other reason for so doing.

Mounted on the hanger J' , which is connected to or forms part of the lower projection G' in the present instance, is a short shaft carrying a bevel-pinion J , meshing with the bevel-gear K on the king-pin, and on the exterior of this short shaft I have shown a crank I , by means of which the breech mechanism may be operated. This crank is shown as provided with a handle I' , having a stop-pin I^2 , engaging a recess i in the side of the breech of the gun when the breech-block is in its locked or operative position. While this is found to be a suitable means of operating the breech mechanism it is understood that other devices may be substituted, according to the requirements of any particular case.

While the lugs or projections G may be formed or attached directly to the breech of the gun I preferably mount them upon a separate and detachable piece Y , which is secured to the breech in any desirable way, and which carries all of the breech-block-operating mechanism and in the present instance including the tray, so that by simply removing the slide or piece Y from the breech all the operating mechanism may be removed and others substituted in case of derangement or for the purpose of adjustment or otherwise.

The tray H , as shown, is attached to an extension of the yoke-piece G^2 and moves therewith, and it may be locked in position against the face of the breech by any suitable mechanism; but I have shown in Figs. 4 an exceedingly simple and useful lock. In this construction there is a block H' , secured to the breech, having a recess h in its upper surface, and mounted in the tray is a vertically-reciprocating locking-pin H^2 , having a beveled end h' and a beveled recess or projection h^2 , and there is a sliding pin or bolt h^3 , parallel with the face of the tray and having a beveled end, as shown.

It will be seen that when the parts are in the position indicated in Fig. 4 the beveled end h' of the locking-pin H^2 engages the beveled slot h in the projection H' and is held in place by the sliding pin h^3 . When, however, the tray is moved away from the breech, the beveled end h' of the pin causes it to rise upward, so that its end projects above the level of the tray and engages a corresponding notch in the face of the breech-block and secures the block to the tray, at the same time forcing the sliding pin h^3 outward. When the tray is swung back to bring the breech-block in position for insertion into the breech, the sliding pin h^3 impinges upon the projection H' , and its beveled end acting upon the beveled slot or projection h^2 forces the locking-pin H^2 into the position shown in Fig. 4, releasing the breech-block and securely holding the tray in position, and it will be seen that these movements are all automatic and that the parts are exceedingly simple.

In order that the bevel gear-segments C and D may be made strong and that they may operate with freedom, I find it an advantage to form the tooth P of the segmental gear D and the tooth Q of the segmental rack C in the form best shown in Fig. 5—that is, with their adjacent edges beveled on one side, so that they may be easily and readily engaged and disengaged at the beginning and end of the rotary movement of the breech-block—and for a similar reason I arrange the tooth R of the spur-pinion gearing E in the manner shown in said figure, it being prolonged slightly, and the rack F is similarly arranged, the recesses or spaces S S' between the adjacent teeth being deeper for the reception of the prolonged tooth R. As a matter of detail, also, I form the segmental bevel-gear D and the bevel-gear M in one piece, as seen in Fig. 3, although they may, of course, be otherwise made and secured together or to the short shaft X.

Such being the general construction and arrangement of parts, the operation will be readily understood by those skilled in the art, and it will be seen that by releasing the pin I² and turning the crank I (supposing the breech-block to be in closed and locked position) the tooth N of the bevel gear-segment D will engage with the space O of the bevel gear-segment C, and the breech-block will be rotated in the breech until the tooth P engages the last space in the segmental rack C, when owing to its peculiar shape and the shape of the corresponding tooth Q a continued rotation of the crank will be permitted without further rotation of the breech-block; but the parts are so proportioned and arranged that at this moment the long tooth R in the spur-pinion E engages one of the recesses S in the rack F, and the breech-block is then withdrawn from the breech onto the tray, and this motion continues until the block is completely removed from the gun, when the tooth R reaches the space S' in the rack F, at which time the block is on the tray H and the pinion E is against the rear end of the cavity or recess F' of the block, and all the gears are practically locked against further movement. By continuing the movement of the crank I in the same direction the tray is unlocked from the breech and swings away from the gun on the hinges, carrying the block to one side, leaving the opening free and unobstructed, and the third step of the movement is finished, and it will be observed that they are all accomplished by the continuous rotation of the crank, the steps succeeding each other automatically and in proper time. When the block is to be restored to position, a reverse movement of the crank first swings the tray with the breech-block into position opposite the opening in the breech and the tray is automatically locked, and then on further movement of the crank the spur-pinion E forces the block into the gun in proper position, when the tooth P engages the recess of the rack C, adjacent the

tooth Q, and rotates the block until it is locked in position, when the crank will be in proper position for the locking-pin I² to engage the recess *i* in the side of the breech and the parts will be held from accidental displacement, while this recess serves as a guide to the operator to insure the complete rotation and locking of the breech-block before the gun is fired.

While in the present instance I have shown the operating devices connected to the lower pintle it is evident they may be arranged in connection with the upper pintle, and instead of the bevel-gears other suitable gears may be substituted and the details of construction otherwise suitably changed.

It will be observed that the mechanism is exceedingly simple and at the same time it is very powerful, and this is an essential feature and great advantage, especially when a gas-check is used in connection with the breech-block, as it then requires considerable power to unlock the block and remove it from the breech.

What I claim is—

1. In a breech mechanism for guns, a breech-block provided with a recess in its side, and a rack arranged in one side of said recess, in combination with a pinion entering the recess in the block and engaging the rack therein substantially as described.

2. In a breech mechanism for guns, the combination with a breech-block provided with a segmental rack and with a recess in its side having the rack arranged in one side of said recess, of a segmental gear engaging the segmental rack, and a pinion entering the recess and engaging the rack therein, substantially as described.

3. The combination with a breech-piece provided with a bevel gear segment on its outer end, and with a longitudinal recess in its side a rack arranged in one side of said recess, of a bevel gear segment mounted on the breech and engaging the segment of the breech-block, and a spur pinion entering the recess in the block and engaging the rack therein, substantially as described.

4. The combination with a breech-piece provided with a segmental rack and with a longitudinal rack, of a shaft having rigidly secured thereto a segmental gear and a pinion respectively engaging the segmental and longitudinal racks of the breech-piece, and means for rotating said shaft, substantially as described.

5. The combination with a breech-piece provided with a segmental rack and with a longitudinal rack, of a shaft having rigidly secured thereto a segmental gear and a pinion respectively engaging the segmental and longitudinal racks of the breech-piece, one of the teeth of the respective segmental gears being cut away, one of the teeth of the pinion being elongated, and the longitudinal rack being provided with a deep recess whereby the said gear and pinion may engage and disengage

the said segmental and longitudinal racks at the beginning and end of their movements, and at the same time operate with freedom and be made strong, substantially as described.

6. The combination with a breech-block having a gear for rotating and a gear for withdrawing the block from the breech, of a yoke piece mounted on the breech, a shaft mounted in the yoke piece, a pinion and segmental gear mounted thereon, and means for rotating said shaft, substantially as described.

7. The combination with a breech-piece having suitable gears, of a yoke piece, gears engaging the gears of the block mounted in the yoke piece, and a tray connected to the yoke piece, substantially as described.

8. The combination with a breech-block having suitable gears, of a hinged yoke piece, a shaft carrying gears engaging the gears of the breech-block and mounted in the yoke, and a pintle having an extension forming a bearing for said shaft, substantially as described.

9. The combination with a breech-block having suitable gears, of a hinged yoke, a shaft mounted in the yoke carrying gears engaging the gears of the breech-block, a pintle forming a support for the shaft, and another pintle carrying a gear connected to operate the shaft, substantially as described.

10. The combination with a breech-block having suitable gears, of a hinged yoke, a shaft mounted in said yoke carrying gears engaging the gears of the breech-block, and means for operating said gears, the said yoke and gears being mounted upon a separable and remov-

able plate adapted to be attached to the breech, substantially as described.

11. The combination with a breech-block having suitable gears, of a separable and removable plate adapted to be attached to the breech, a tray to receive the breech-block connected to the plate and gears for operating the same, and mechanism for operating the gears mounted on the separable and removable plate, substantially as described.

12. The combination with a breech-block having suitable gears, of a yoke piece supporting the tray to receive the block, a shaft carrying gears engaging the gears of the breech-block mounted in the yoke and moving therewith, and operating mechanism for said gears the arrangement being such that the block is rotated in and withdrawn from the breech onto the tray and swings with the yoke and tray while the operating mechanism is continuously moved in one direction, substantially as described.

13. The combination with a breech-block having suitable gears, of a hinged yoke piece, and gears mounted in the yoke piece engaging the gears of the breech-block, one of the pintles of the yoke piece forming a bearing to support the gears and the other carrying a driving gear for operating the same, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OWEN FRANKLIN LEIBERT.

Witnesses:

H. B. STERN,

R. W. LEIBERT.