

(No Model.)

4 Sheets—Sheet 1.

A. WELIN.
BREECH MECHANISM FOR GUNS.

No. 497,695.

Patented May 16, 1893.

Fig. 2.

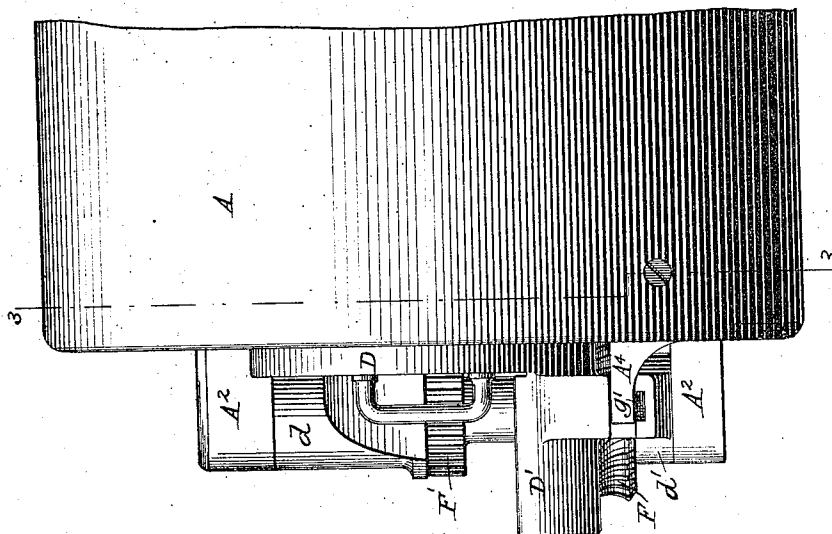
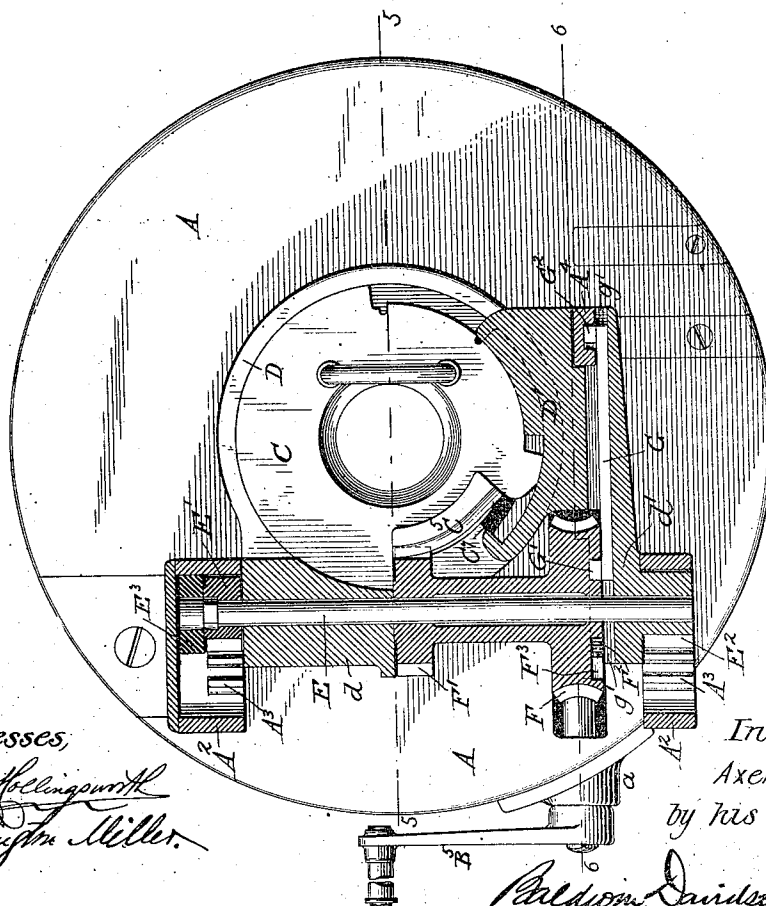


Fig. 1.



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Richard Davidson Wg

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Fig. 3.

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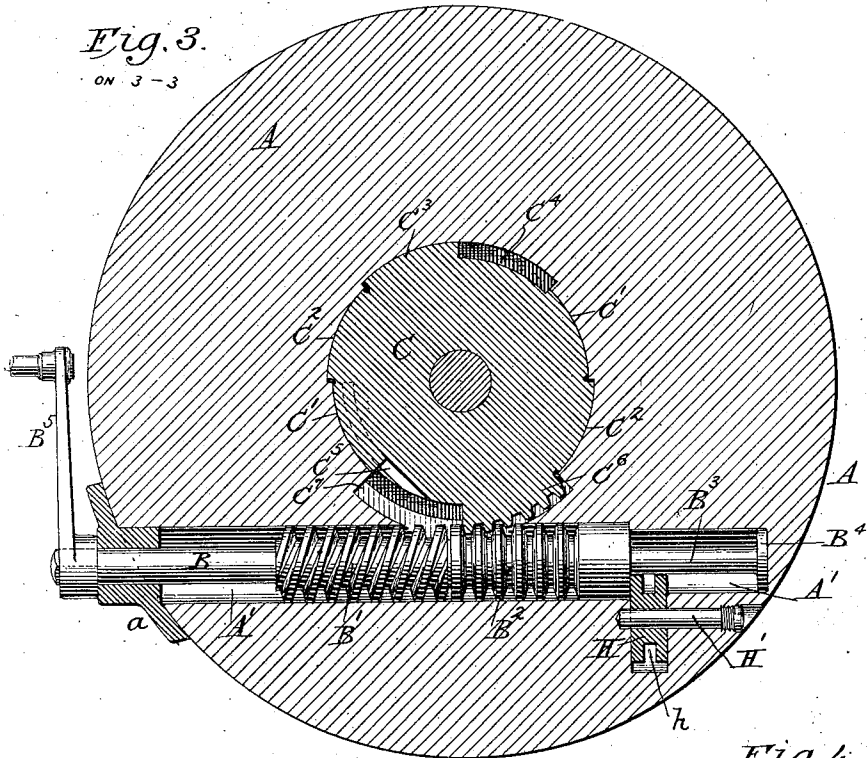
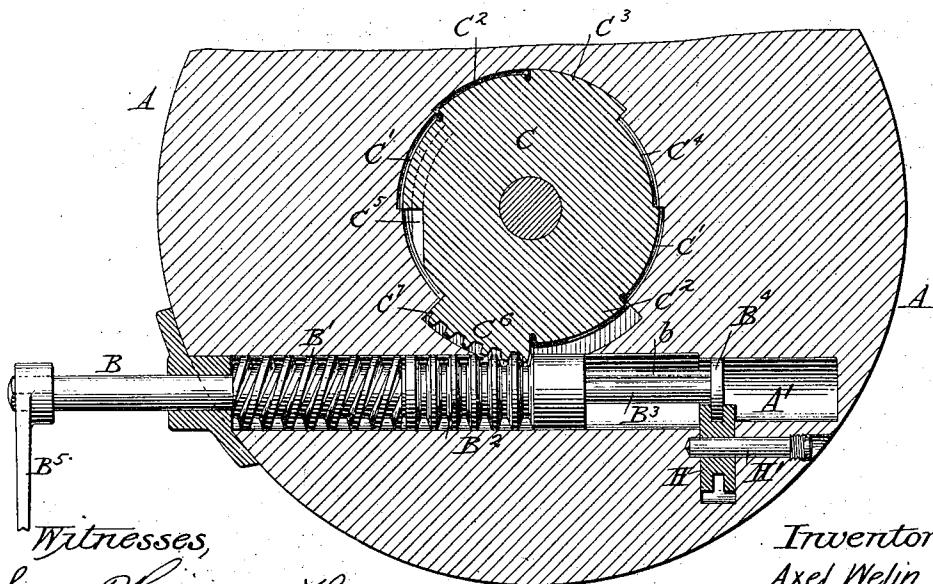


Fig. 4.



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Fig. 5. Patented May 16, 1893.

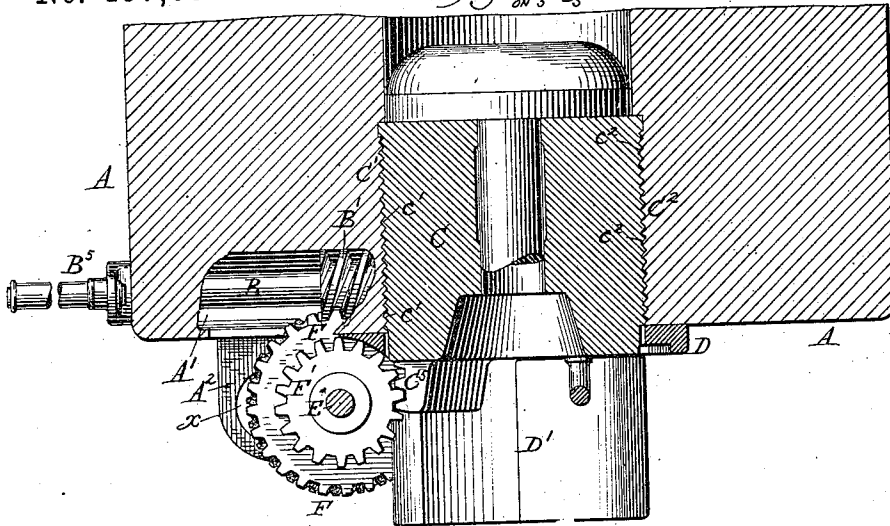


Fig. 6.

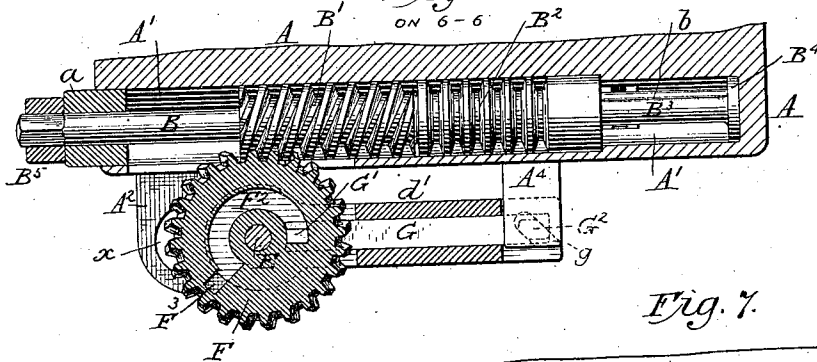
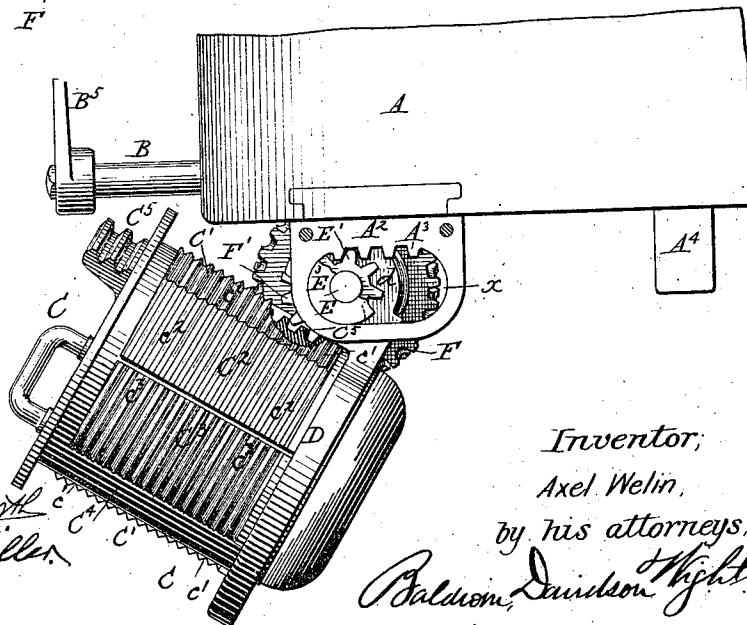


Fig. 7.



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UNITED STATES PATENT OFFICE.

AXEL WELIN, OF LONDON, ENGLAND.

BREECH MECHANISM FOR GUNS.

SPECIFICATION forming part of Letters Patent No. 497,695, dated May 16, 1893.

Application filed July 11, 1892. Serial No. 439,640. (No model.) Patented in France July 25, 1891, No. 215,118; in Germany July 30, 1891, No. 61,561, and in Sweden August 27, 1891, No. 3,434.

To all whom it may concern:

Be it known that I, AXEL WELIN, mechanical engineer, a subject of the King of Sweden and Norway, residing at the Scandinavian Sailors' Temperance Home, Garford Street, London, in the county of Middlesex, England, have invented certain new and useful Breech Mechanism for Guns, (for which I have received Letters Patent in France, No. 215,118, dated July 25, 1891; in Germany, No. 61,561, dated July 30, 1891, and in Sweden, No. 3,434, dated August 27, 1891,) of which the following is a specification.

The object of my invention is to provide improved mechanism for opening and closing the breech of a gun.

My improvements are hereinafter fully described, and are clearly illustrated in the accompanying drawings, in which—

Figure 1 is a rear elevation (partly in section), of the breech end of a gun with my improvements applied. Fig. 2 is a side elevation thereof. Fig. 3 is a transverse section on the line 3—3 of Fig. 2, with some of the interior parts in elevation. Fig. 4 is a similar transverse section with the parts in different positions from those shown in Fig. 3. Fig. 5 is a central section on the line 5—5 of Fig. 1, with some of the interior parts in elevation. Fig. 6 is a similar section on the line 6—6 of Fig. 1. Fig. 7 is a plan view of the breech end of the gun, with the breech block withdrawn and swung back. Fig. 8 is a side elevation of the breech block. Fig. 9 is a transverse section thereof on the line 9—9 of Fig. 8. Fig. 10 is a rear elevation of the carrier ring and table. Fig. 11 is a side elevation of the same. Fig. 12 is a detail view in section, showing particularly the construction and operation of the mechanism for locking the carrier ring to the mechanism for withdrawing it from the breech of the gun. Fig. 13 is a plan view of the carrier ring and table. Figs. 14 and 15 are detail views on an enlarged scale of the mechanism for controlling the longitudinal movement of the screw shaft which operates the breech block.

A hole A is bored transversely in the rear end A , of the gun below the breech opening. The hole A' extends nearly but not quite through the gun and at one end is closed by

a cap. Within the hole is arranged a shaft B , which is provided with a worm B' and a series of collars B^2 , (five being shown.) It is also provided with a pinion B^3 , having a single tooth b , (see Figs. 14 and 15.) At the extreme inner end of the shaft is a disk B^4 , while the outer end of the shaft carries a handle B^5 .

The breech block C , is provided with a series of screw segments $C' C'$, $C^2 C^2$, $C^3 C^3$, and segmental spaces $C^4 C^4$. The screw segments C' and C' , are similar in every respect, and are at equal distances from the center. The threads c' of the screw segments $C' C'$ are of smaller radius or nearer to the center of the block than the screw threads c^2, c^2 , of the segments $C^2 C^2$, and the screw threads $c^2 c^2$ of the segments $C^2 C^2$ are nearer to the center than the screw threads c^3, c^3 of the segments $C^3 C^3$. The inner walls of the spaces $C^4 C^4$, are nearer to the center than the screw threads c^3, c^3 . Each set of teeth or screw-threads in each successive arc of the circumference is thus arranged at different distances from the center or axis of the block. Each segment occupies about one-eighth of the circumference of the block. The block is, therefore, divided into eight divisions. The breech of the gun has screw threads on it corresponding with each of the screw-threads on the block. When the breech block is turned in the breech of the gun through an arc of forty-five (or one-eighth of an entire revolution), the screw threads c' assume the position previously occupied by the screw thread c^2 , but being of smaller diameter, do not engage with the threads within the breech of the gun. Similarly, the screw threads c^2 pass to the position previously occupied by the screw threads c^3 and likewise, do not engage. At the same time, the screw threads c^3 pass to the blank segments in the breech of the gun (corresponding to the blank segments C^4). The breech block may then be drawn rearward out of the gun. Similarly; when the breech block is replaced, a rotation through an arc of forty-five degrees (or one-eighth of an entire revolution) locks it securely. The breech block also has upon it a longitudinal rack or series of teeth C^5 , see Fig. 8. This rack extends from one end of the breech block to the other, the last few teeth at the rear end or outer end, as shown in Fig.

8, being longer than the other teeth. The breech block is also provided with a series of teeth C^6 , clearly shown in most of the figures, which gear with the collars B^2 , on the shaft B , of the handle.

The breech block is supported by a carrier ring D , and cradle or table D' , the construction of which is shown in detail in Figs. 10, 11 and 13, and which is also shown in working position in other figures of the drawings. This ring and table are hinged to the gun by a vertical shaft E , having upon its opposite ends pinions E' E^2 , partly toothed and partly plain, as shown in Fig. 1 and also more clearly in Fig. 13. These pinions work in slots a , in brackets A^2 , fixed on the rear end of the gun. On one side of each slot there is a series of teeth A^3 , which gear with the teeth upon the pinion E' or E^2 . The shaft E , also has at its upper end a friction roller E^3 , and near its lower end, a worm-wheel F , which is formed integrally with a pinion F' , located above it. In Fig. 1, the arms d d' of the carrier-ring are seen arranged on the shaft E , above the pinion F' , and below the worm-wheel F . The worm-wheel F , gears with the worm B' on the shaft B , and the pinion F' gears with the longitudinal rack or series of teeth C^5 , on the breech block. This detail of construction is shown clearly in Fig. 5. It is also indicated in other figures.

A locking bolt G , is arranged to slide in a slot g' , in the under side of the table D' , as shown in Figs. 1 and 12. It has upwardly projecting lugs G' and G^2 . Lug G' either lies in a curved slot F^2 in the worm-wheel F , or else engages with a notch F^3 , at one end of the slot F^2 , (see Fig. 12.) The lug G^2 , when the table D' is in contact with the breech of the gun, lies in an inclined notch g in a bracket A^4 secured to the gun. A pinion H , is mounted on a shaft H' , (Figs. 3 and 4,) secured to the gun. Its edge is slotted at h , to receive the disk B^4 , secured to the end of the shaft B . The teeth of the pinion H , have circular concave tops (Fig. 14), in which the cylindrical part of the single toothed pinion B^3 lies, so that the pinion cannot turn until the tooth b of the pinion B^3 comes into gear with it. The pinion H is provided with a notch H^2 for a purpose hereinafter described.

The construction of the mechanism having now been clearly described, I will describe the operation of the apparatus.

It is clear that when the breech block C is screwed home or locked in the breech of the gun, the worm-wheel F , cannot turn because it is geared to the block by the pinion F' , and rack C^5 , and as the pinion F' cannot move the block, it being already locked, the worm-wheel F , at the first part of the movement of rotation of the handle, will act as a fixed nut for the worm B' to work in, so that at first the rotation of the handle causes the shaft B to move lengthwise, or from right to left, as shown in Fig. 2, and thus, by reason of the

collars B^2 engaging with the teeth C^6 , the breech block C will be caused to rotate and disengage its screws C' C^2 , C^3 from the corresponding screws in the breech in a manner heretofore explained, and as shown in Fig. 4. When the breech block has thus been unlocked, a further longitudinal movement of the handle is prevented, the segment of teeth C^6 being stopped by a corresponding shoulder in the recess C^7 , in which it moves. As the handle is coming to the end of its longitudinal movement, the disk B^4 passes through the notch H^2 , in the outer side of the pinion H , and into the central slot in the curved face of the pinion (see Fig. 4). The breech block having now been unlocked, and the worm-wheel F freed, the continuous rotation of the handle causes the worm-wheel F to rotate, and since the pinion F' fixed to the wheel F , is in gear with the rack C^5 on the breech block, the latter is withdrawn rearwardly. It is to be observed, that each rotation of the handle after its longitudinal movement has ceased, moves the pinion H through a space equal to one tooth, and carries the notch H^2 away from the disk B^4 , so that the shaft B , cannot again move longitudinally until an equal number of turns in the reverse direction have been given to it. When the block is fully withdrawn, the notched end of the slot F^2 , in the worm-wheel F , comes against the lug G' , on the bolt G , and prevents it from any longer turning relatively to the table D' . Its further rotation, therefore, causes the table D' and carrier-ring D , the breech block C , to swing back rearwardly about the shaft E . As the table D' , comes away from the breech of the gun, the inclined slot g , in the bracket A^4 , acting on the lug G^2 , on the bolt G , draws the bolt to the right, causing the lug G' to enter the notch F^3 , in the worm-wheel F , locking the latter firmly to the table D' . At this time, also the pinions E' and E^2 , on the shaft E , come into gear with the racks A^3 , and in this way, the breech block as it swings back is also carried to one side well clear of the breech opening, as shown in Fig. 7. In closing the breech, the reverse takes place. The breech block swings back, and as the table D' , comes against the gun, the bolt G , is withdrawn by means of the inclined slot g and lug G^2 . The worm-wheel F , is freed, and its movement through the pinion F' runs in the breech block. When this has been done, the end of the slot F^2 in the worm-wheel F , comes against the lug G' and arrests the rotation of the worm-wheel F . The notch H^2 has now, however, come back to the disk B^4 , and freed the handle longitudinally, so that its continued rotation turns and locks the breech block.

I claim as my invention—

1. The combination with a gun having divided screw threads in the breech, of a breech block having divided screw-threads thereon, the segments of the said screw-threads in each successive arc of the circumference be-

ing arranged in steps or divisions at different distances from the center or axis of the gun and block.

2. A breech block having a series of sets of teeth or screw-threads, each set in each successive arc of the circumference being arranged at a different distance from the center or axis of the block.

3. The combination with the breech of a gun, of a breech block adapted to turn in the breech opening, a longitudinal rack or series of teeth upon the breech block, a pinion gearing with the rack, a support or carrier for the block when withdrawn hinged to a shaft which carries the pinion a rack upon the gun, teeth upon the shaft which engage with the rack on the gun after the block has been withdrawn, whereby the block is carried with its support to one side clear of the opening of the breech, and means for operating the pinion and connections between the shaft of the pinion, and the support for the breech block.

4. The combination with a gun, a breech block, means for turning it in the breech opening to lock and unlock it, a pinion engaging with a longitudinal rack on the breech block, means for operating the pinion to move the block longitudinally to withdraw it from the gun, a shaft on which the pinion is mounted, stationary racks or teeth on the gun and devices carried by the shaft of the pinion which engage with the racks or teeth, whereby when the breech block is withdrawn from the gun it is carried to one side, clear of the opening of the breech.

5. The combination with a gun, of a breech block locked and unlocked by a partial turn, a shaft mounted in the gun and free to rotate and also to move longitudinally, devices for limiting the longitudinal movement of the shaft, gearing connecting the shaft to the block for turning it as the shaft moves longitudinally, and gearing connecting the shaft with the block for moving the block longitudinally, as the shaft rotates.

6. In breech mechanism for guns, the combination with a breech block locked and unlocked by a partial turn, a shaft free to rotate and also to move longitudinally, gearing connecting the shaft with the block for turning it, as the shaft is rotated and as it is moved longitudinally, and gearing connecting the shaft and the block to withdraw the block from the breech opening as the shaft is rotated and is held against movement longitudinally.

7. The combination with a gun, of a breech block locked and unlocked by a partial turn, a series of teeth, and a longitudinal rack upon the block, a shaft free to rotate and also to move longitudinally, collars on the shaft engaging with the series of teeth on the block, a worm on the shaft, a worm wheel gearing with the worm on the shaft, and a pinion connected with the worm wheel and gearing with the rack on the block.

8. The combination with the breech of a

gun, of a breech block locked and unlocked by a partial turn, a series of teeth, and a longitudinal rack on the breech block, a shaft free to rotate and also to move longitudinally, devices for intermittently holding the shaft against longitudinal movement, collars on the shaft gearing with the teeth on the block, a worm on the shaft, a worm wheel gearing therewith, a pinion connected with the worm wheel and gearing with the rack on the block, and a table or support for the breech block, hinged to the shaft which carries the worm wheel, and which turns with said shaft and worm wheel.

9. The combination with the breech of a gun, of a breech block locked and unlocked by a partial turn, a series of teeth and a longitudinal rack on the breech block, a handle having a shaft free to rotate and also to move longitudinally, collars on the handle gearing with the teeth on the block, a worm on the handle, a worm-wheel gearing therewith, a pinion connected with the worm-wheel and gearing with the rack on the block, a support for the block hinged to the shaft of the worm-wheel, a rack on the gun, a series of teeth fixed to the gun, and teeth carried by the shaft of the worm-wheel which come into gear with the rack on the gun after the block has been withdrawn and carry it and its support to one side, clear of the opening of the breech.

10. The combination with the gun, of a breech block locked and unlocked by a partial turn, a series of teeth and a longitudinal rack on the breech block, a handle having a shaft free to rotate and also to move longitudinally, collars on the shaft gearing with the teeth on the block, a worm on the shaft of the handle, a worm-wheel gearing therewith, a pinion connected with said worm-wheel and gearing with the rack on the block, a table or support for the block hinged to the shaft of the worm-wheel, mechanism for locking the table to the worm-wheel when the former is turned back away from the gun, and mechanism for preventing the handle from moving longitudinally when the breech is being closed until the block has been run home longitudinally.

11. The combination with the gun, of a breech block locked and unlocked by a partial turn, a series of teeth and a longitudinal rack on the breech block, a handle having a shaft free to rotate and also to move longitudinally relatively to the gun, collars on the handle gearing with the teeth on the block, a worm on the handle, a worm-wheel gearing therewith, a pinion connected with said worm-wheel and gearing with the rack on the block, a table or support for the block when withdrawn, hinged to the shaft of the worm-wheel, a bolt in the table having two lugs, a circular slot in the worm-wheel receiving one of said lugs and having a notch at one end, a bracket secured to the gun and having a slot to receive the other lug, a disk secured to the shaft of the handle, a pinion on the gun having a groove in its curved face to receive the said

disk, and a notch at one side to allow the disk to escape at one point from the groove, and means for rotating the pinion slower than the handle.

- 5 12. The combination with the gun, of a breech block, locked and unlocked by a partial turn, a shaft mounted in the gun and free to rotate and also to move longitudinally, gearing connecting the shaft to the block for turning it, gearing connecting the shaft with the
10 block for moving the block longitudinally, a table or support for the breech block when withdrawn, connections between this table

and the shaft for moving it away from the breech opening, as the shaft is operated, and the locking mechanism engaging the shaft to prevent its longitudinal movement when it is turned or rotated to return the table into position at the breech of the gun. 15

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