

C. P. E. SCHNEIDER.
BREECH OPERATING MECHANISM OF ORDNANCE.
APPLICATION FILED NOV. 14, 1905.

1,020,577.

Patented Mar. 19, 1912.

4 SHEETS—SHEET 1.

Fig. 1.

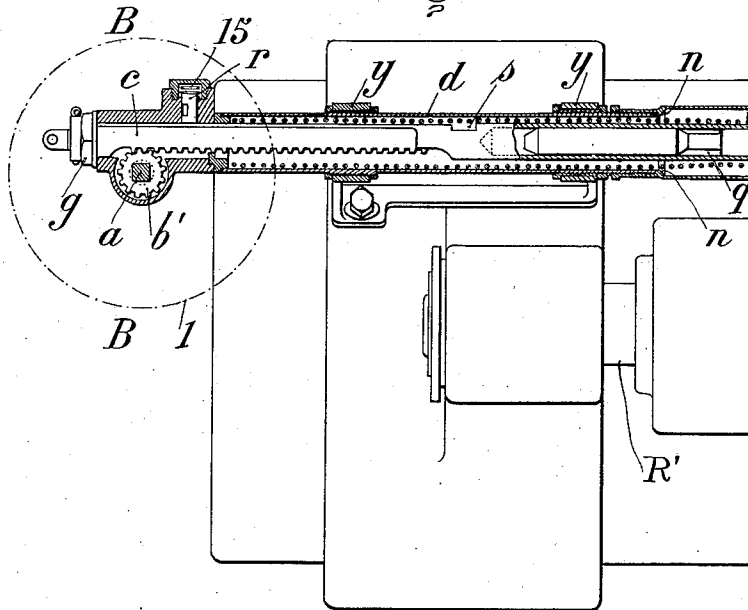
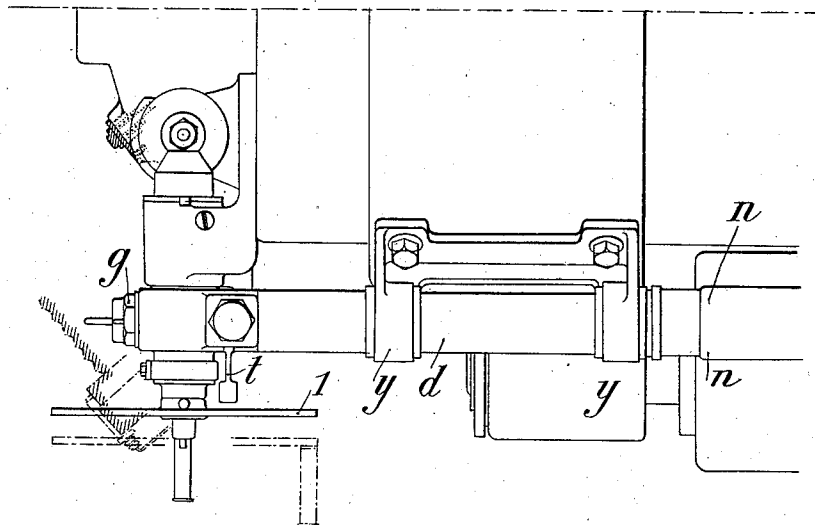


Fig. 6.



Witnesses:

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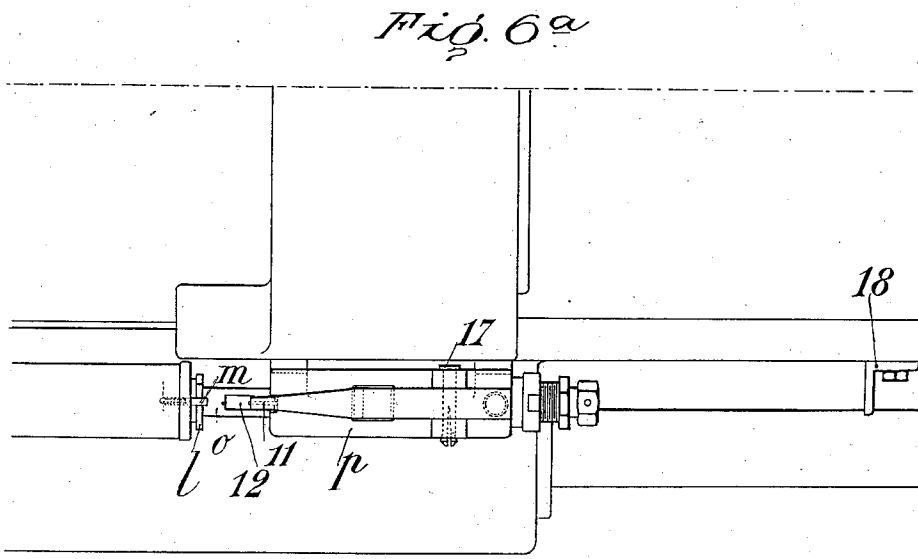
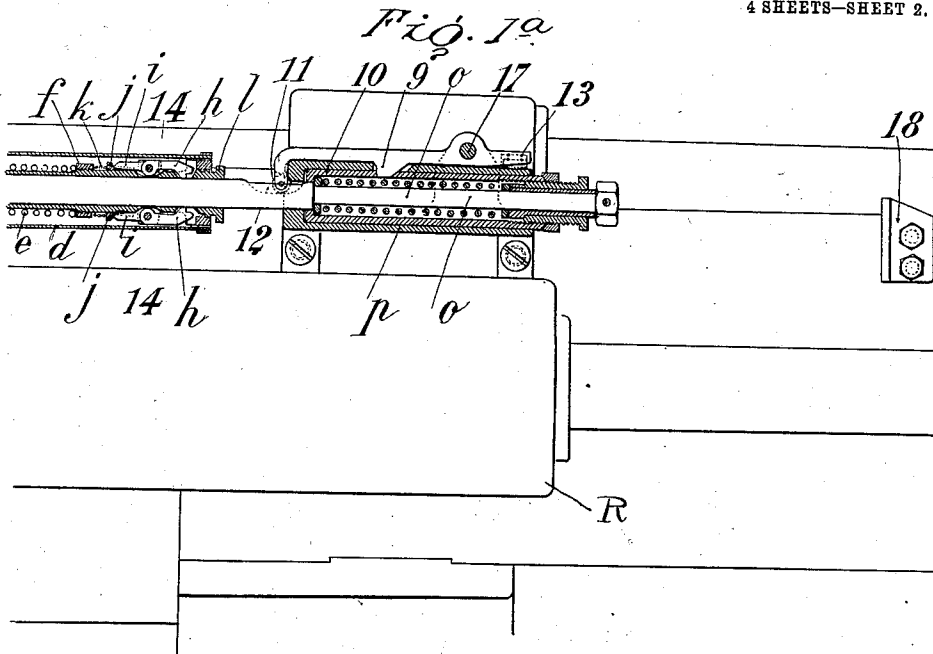
Mauro, Cameron, Lewis & Massie, Attys.

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4 SHEETS—SHEET 2.



Witnesses:
Gustave O. Thompson. *Inventor:* Charles P. E. Schneider,
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UNITED STATES PATENT OFFICE.

CHARLES PROSPER EUGÈNE SCHNEIDER, OF LE CREUZOT, FRANCE.

BREECH-OPERATING MECHANISM OF ORDNANCE.

1,020,577.

Specification of Letters Patent.

Patented Mar. 19, 1912.

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To all whom it may concern:

Be it known that I, CHARLES PROSPER EUGÈNE SCHNEIDER, a citizen of the Republic of France, residing at Le Creuzot, Saône-et-Loire, France, have invented certain new and useful Improvements Relating to the Breech-Operating Mechanism of Ordnance, of which the following is a specification.

This invention relates to automatically operated breech-loading ordnance, and has for its object to provide a structure of this class which shall be automatically operated by energy stored during the recoil and applied upon counter-recoil of the gun to automatically open the breech, and, after loading to automatically close the breech.

The invention further has for its object to provide automatic mechanism of the kind last described with means whereby the automatically operating features may be thrown out of operation and the breech mechanism manually operated either in opening or closing, or in both opening and closing the breech.

The inventive idea involved may receive a great variety of mechanical expressions, one of which, for the purpose of illustration, is shown in the accompanying drawings.

In said drawings, Figures 1 and 1^a are to be read as a continuous view, and the same is true of Figs. 6 and 6^a. In said drawings Figs. 1 and 1^a together show a side elevation of the rear portion of the gun with parts in section on the line A—A, Fig. 2. Fig. 2 is a section on the line B—B, Fig. 1. Fig. 3 is a similar section to Fig. 2, the mechanism being shown in the position which the parts occupy for operation by hand. Fig. 4 is a rear elevation of Fig. 2. Fig. 5 is a side elevation of Fig. 2 looking from right to left. Figs. 6 and 6^a together are a plan corresponding to Figs. 1 and 1^a; and Fig. 7 is a broken detail showing the support for the inclosing box or cylinder for the mechanism for automatic operation.

Referring to the drawings, in which like reference characters indicate like parts throughout the several views, *v* is a beveled gear secured to the upper end of the main hinge-pintle or bolt through which the breech mechanism is operated in ways well-known in the art. This beveled gear *v* is engaged by a beveled gear *u* on the interior end of a shaft *a* turning in suitable bearings provided on the breech of the gun. The ex-

terior portion of this shaft *a* has mounted thereon a sleeve *b* upon which there is integrally formed or otherwise secured a pinion *b'*. The sleeve *b* is capable of longitudinal adjustment along the exterior portion of shaft *a* and has formed through its center a squared hole, which, when the parts are in position for automatic operation, as shown in Fig. 2, engages a squared portion 4 of the shaft *a* and thus is compelled to revolve with the shaft. Exterior to the squared portion of shaft *a* is a rounded portion 3 of such dimensions that the squared opening through the sleeve *b* will just permit the sleeve to slide over the rounded portion 3. On the exterior end of shaft *a* there is a sleeve 16 secured to sleeve *b* by a channeled split ring 2, and on the exterior end of the sleeve 16 there is mounted a hand-wheel 1. This hand-wheel is keyed to sleeve 16 as by having a squared hole thereof fitting the squared end of the sleeve, and is retained in position on the sleeve by spring-actuated bolt 8, see Fig. 3.

From the foregoing, it will be perceived that the shaft *a* is provided with two squared portions 4 and 5, with an intermediate round or cylindrical portion 3. As shown, these squared portions 4 and 5 have the corners of the square slightly cut or rounded, as will be best understood by an inspection of Fig. 5. In the counter-bore in the end of shaft *a* there is placed a spring-pressed counter-bolt 7 constructed as shown in Fig. 2, that is, with a notch or depression formed therein, and said bolt is normally held pressed outward in the position shown in Fig. 2 whereby a bolt 6 is raised so as to enter either one of two annular grooves *z*, *z'* in the hub 16, thereby restraining the hub from longitudinal movement upon the shaft *a*. By pushing in the counter-bolt 7 the lock-bolt 6 will drop into the groove or depression of the counter-bolt thereby freeing the hub 16, and the same may then be drawn from the position shown in Figs. 2 and 4 to the position shown in Fig. 3 as indicated in dotted lines in Fig. 4. When the parts reach the position shown in Fig. 3 the spring of the counter-bolt 7 will again force it forward and it will then act to lift bolt 6 into the retaining groove *z*, as shown in Fig. 3.

Referring to Figs. 1, 1^a, 6, 6^a, *d* is a cylindrical casing mounted in brackets *y*, *y* secured to the rear of the gun. Within this

casing *d* there is a rack bar *c* having on one end a rack for engagement with the pinion *b'* on the shaft *a*, and at the other end a pair of pawls *h, h*, pivoted to the rod at 14, 14, the tails of said pawls being acted upon by beveled ring *j* forced toward the pawls by means of a spring *k* reacting against a ring *f* screw-threaded upon the rack-bar *c*, all as clearly shown in Fig. 1^a. Surrounding the rack-bar *c* and reacting between the screw-threaded collar *f* thereon and the rear end of the casing *d* is a spring *e*. In the front end of the casing *d* there is a quick-threaded nut *l* provided with suitable cam-faces which, when the nut *l* is turned in one direction, acts to engage the pawls and hold them out of operation as hereinafter described, but when said nut is turned in the other direction it leaves the pawls free to move inward, as will be more fully described hereinafter. The flanged nut *l* is provided with two oppositely placed notches into which enters spring-pressed catch *m*, whereby the nut *l* can be held in either of two positions for permitting the pawls to act or for locking them against action.

The rack-bar *c* is hollow at its forward portion, within which hollow portion there is placed a buffer bar *o* carried by a support *p* fixed upon the cheek of the relatively stationary gun-carriage. The bar *o* has formed near its rear extremity an annular groove *q* whose forward wall is in a plane substantially at right-angles to the axis of the rod. The forward extremity of the buffer rod or bar is retained in the support *p* by an elastic mounting which serves to deaden the shock at the beginning of the opening of the breech, and furthermore, the same is so constructed as to permit the rod or bar *o* to yield whenever the force required to open the breech would exceed the strength of the parts. For this purpose the forward end of the buffer rod *o* is surrounded by a buffer box 10 inclosing a spring which surrounds the rod *o* and bears against a collar on the rod *o* and against a screw-threaded adjustable plug in the forward end of the buffer-box 10, as clearly shown in Fig. 1^a. The buffer box 10 is free to slide in the bearing support *p* but for the action of a pawl 9 which engages against a shoulder formed by a notch cut in the buffer box, the pawl being pivoted at 17 and normally held in engagement with the buffer box by a strong spring 13. The pawl is extended rearward and at its extremity is bent downward in right-angular form and provided with an anti-frictional roller 11 taking in a short groove 12 in the buffer bar *o*, the rearward end of the groove being sharply inclined. When the buffer box 10 is freed from engagement with the pawl 9 and the buffer bar is driven forward it is limited in its forward movement by an

angle piece 18, clearly shown in Figs. 1^a and 6^a.

The diameter of the casing *d* is materially contracted about mid-way of its length, forming cam-like shoulders *n* which act upon the pawls *h, h* in a manner hereinafter to be described. There is also provided in the rack-bar a notch *s* which, when the rack-bar has been moved to the position to open the breech, as hereinafter described, is engaged by a catch *r*, Fig. 1, under the influence of a spring 15. This catch *r* is engaged by a lever *t*, as shown in Fig. 2, by which it may be raised against the tension of its spring.

Before the gun has been fired the different operations of opening and closing the breech are necessarily effected by hand, and this is accomplished by placing the hand-wheel 1 and its connected parts in the position shown in Fig. 3, where it will be seen, the pinion *b'* is out of engagement with the rack *c*, the hand-wheel, however, being on the squared portion 5 of the shaft *a* is keyed thereto so that by turning the hand-wheel the shaft *a* will be operated, and, through the pinions *v* and *u*, the hinge-pintle of the breech-mechanism will be actuated to open the breech. The gun having been loaded and the breech closed by the reverse movement of the hand-wheel 1, the gunner then pushes in the counter-bolt 7, thereby permitting the catch bolt 6, Fig. 3, to drop out of the annular locking groove 2 thus freeing the sleeve 16 and its connected parts so that the same may be pushed inward along the shaft *a* until the pinion *b'* engages the rack *c*, as shown in Fig. 2, at which time the counter-bolt 7 is driven outward by its spring and raises the catch 6 into its groove *z'*, thereby locking the parts in the position shown in Fig. 2. In this position the hub 16 of hand-wheel 1 is on the rounded portion 5 of shaft *a*, and therefore is not revolved when the shaft revolves. The pinion sleeve *b*, however, is upon the squared portion 4 of the shaft *a*, and is therefore keyed to and revolves therewith. With the parts in this position, that is, in the position shown in Figs. 1, 1^a and 2, the gun being fired, the casing *d* with all of its contained parts except the buffer rod *o* moves rearward with the gun as well as the shaft *a* and the pinion *b'*, the recoil of the gun being controlled by the recoil-check diagrammatically illustrated by the recoil cylinder *R* and the piston-shaft *R'*, see Figs. 1 and 1^a.

During the time when the breech-mechanism was operated by the hand-wheel with the parts in the position shown in Fig. 3, the nut *l*, Fig. 1^a, was adjusted in such a position as to engage and retain the pawls *h, h* in the position shown in Fig. 1^a. When, however, the hand-wheel and its connected parts are adjusted in the position shown in

Fig. 2 for automatic operation the nut *l* was given a partial turn so as to free it from engagement with the pawls *h*, *h*, and as they move rearward under the force of recoil, the pawls fall into the annular groove *q* on the buffer rod *o*, being actuated by the beveled ring *j*, under the influence of the spring *k*. The result of this engagement of the pawls with the buffer rod *o* is that all of the parts connected to the gun, including casing *d* and its included elements move forward on counter-recoil of the gun except the rack-bar *c*. The result of this relative movement between the gun and the rack-bar is the revolution of the pinion *b'* and the engagement with the rack-bar *c*, and hence the revolution of shaft *a*, which in turn, through the pinions *v* and *u* operates the pintle 1 to open the breech mechanism. As the cylinder moves forward with relation to the rack-bar (the pawls *h* engaging the groove *q* on the buffer rod) the beveled shoulders *n* of the casing *d* are brought in contact with the tails *i* of the pawls, thereby depressing them and lifting their noses out of the groove *q*, and the rack-bar *c* would then be at liberty to move forward under the tension of its spring *e* but for the fact that, just as the pawls are lifted from the groove *q*, the catch *r* comes opposite to and takes into the notch *s* on the rack-bar. In this position the pawls are held out of engagement with the beveled bar *o* and the rack-bar is free to move forward under the influence of its spring but for the engagement of the catch *r* with the notch *s*. When the gun has been loaded and the gunner desires to close the breech, he has but to depress the lever *t*, thereby lifting the catch *r* out of the notch *s*, whereupon the rack-bar is driven forward by its spring *e* and thereby actuates the shaft *a* to close the breech.

During the time that the pawls *h* are in engagement with the groove *q* on the buffer bar to effect the opening of the breech mechanism, and particularly at the instant when the shock of counter-recoil is received upon the buffer bar *o*, such shock is absorbed to a certain extent by the spring surrounding the rod in the buffer casing 10. The yielding of this spring permits relative movement between the buffer rod *o* and the end of pawl 9 where the same takes into the notch 12 on the rod, and should the shock be sufficient to force the tapering rear end of the groove 12 under the anti-frictional roller 11 on the end of the pawl said pawl would be lifted, thereby disengaging the pawl from the buffer box 9, whereupon the latter then moves forward with the buffer-bar, being restrained from such forward movement only when it comes into contact with the stop 18.

It will be understood that the forward thrust of the rack-bar *c* under the influence

of its spring is limited and controlled by a nut *g* screwed onto the rear end of the rod and impinging against the bearing bracket, as clearly shown in Fig. 1. It will thus be seen that there is provided by the present invention automatic mechanism by which the breech of the gun is opened by the energy of recoil when the same is acting to effect counter-recoil of the gun, and that such automatic mechanism is so constructed that in case of any severe strains such as might cause the breakage of any parts of the mechanism, an escapement is provided whereby, before the strain reaches the dangerous point, the parts will yield. Moreover, the entire mechanism is readily and speedily converted from an automatic to a manually operated device, and vice versa. It will also be perceived that by mounting the collar *f* by means of screw-threads upon the beveled bar *c* the same may be adjusted so as to increase or decrease the tension of spring *e*.

What I claim and desire to secure by Letters Patent of the United States is:—

1. The combination with a gun, of a spring, automatic means actuated by energy due to the recoil of said gun for compressing said spring, an automatic device independent of the breech mechanism for locking said spring in its compressed position, a device for releasing the same, means actuated alternately by the energy of recoil and by said spring for respectively opening and closing the breech of said gun automatically, and devices for opening and closing said breech manually independent of said recoil and said spring.

2. The combination with a gun, of a spring, automatic means actuated by energy due to the recoil of said gun for compressing said spring, an automatic device independent of the breech mechanism for locking said spring in its compressed position, a device for releasing the same, means actuated alternately by the energy of recoil and by said spring for respectively opening and closing the breech of said gun automatically, devices for opening and closing said breech manually independent of said recoil and said spring, and means for throwing said automatically-operating means out of gear and said manually-operating devices into gear and vice versa.

3. The combination with a gun and its breech block, a pivot for said block, a gear carried by said pivot, a countershaft actuating said gear, means for manually operating said countershaft, and additional means for automatically operating said countershaft consisting of a rack carried by the gun and co-acting with said countershaft, automatic means for locking said rack independently of the gun to hold it in the rearward position given by the recoil of the gun, a

spring connected with said rack and compressed by the counter recoil of the gun, and means for releasing said rack whereby said spring will actuate the rack and thereby the
5 breech-block.

4. The combination with a gun and a stationary support therefor, of a tube detachably locked upon said gun, a rack bar and a compression spring in said tube, a gear engaging said rack bar and carried upon the
10 gun, and means operating to compress said spring on counter recoil and to automatically actuate the gear to operate the breech-block.

15 5. The combination with a gun and a stationary support therefor, upon which the former has relative movement during its recoil and its return to battery, a spring and a rack bar interposed between said parts,
20 said rack bar engaging a gear that operates the breech-block, and said spring being compressed by the counter recoil of the gun, means for locking said rack bar in its rearward position, and means for permitting
25 prior or subsequent movement of the gun without compressing said spring.

6. The combination of a gun, a stationary support therefor, a tube carried by said gun and containing a rack and also a spring, a
30 gear actuated by said rack and serving to operate the breech-block, and means operating to compress said spring on counter recoil and to automatically actuate the rack and gear to operate the breech-block.

35 7. The combination with a gun and its breech block, of a relatively stationary support for said gun, a reciprocating bar capable of being locked with respect to said support, a relatively stationary member ar-

40 ranged parallel with said bar and along which said bar reciprocates, a shoulder provided on said member, connections between said bar and breech block, a spring associated with said bar and movable therewith on
45 recoil, and a member movable with said spring and engaging said shoulder for compressing said spring on counter recoil and automatically operating the breech block.

8. The combination of a gun, a stationary support therefor, a tube carried by said gun
50 and containing a reciprocating rack, a spring associated with said rack and continuously inclosed in said tube and movable with said rack, a relatively stationary member associated with said rack, an abutment
55 provided on said member, and a member movable with said spring and engaging said abutment whereby said spring is compressed on counter recoil.

9. The combination with a gun and its
60 breech-block, a stationary support therefor, of telescoping members connecting the breech-block and the support, a spring interposed between said members, an abutment
65 provided on one of said telescoping members, a catch provided on the other telescoping member and engaging said abutment to hold said members in extended position,
70 and means whereby said spring is compressed on counter recoil and the breech-block automatically actuated.

Signed at Le Creuzot, Saône-et-Loire France this 6th day of September 1905.

CHARLES PROSPER EUGÈNE SCHNEIDER.

Witnesses:

EDMOND BLAÏSE,
ERNEST VALOT.