M. HERMSDORF.

BARREL RECOIL GUN.

APPLICATION FILED FEB. 4, 1911.

1,066,814.

Patented July 8, 1913

3 SHEETS—SHEET 1

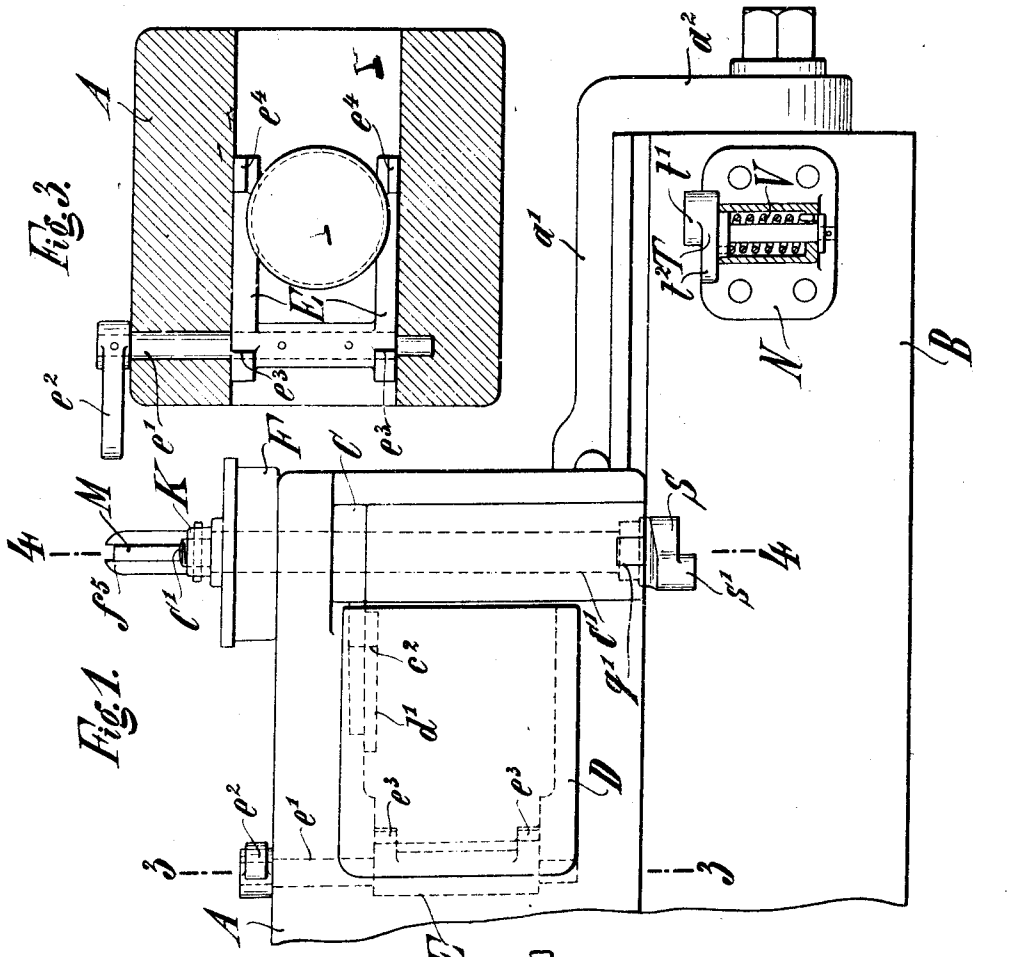


Fig. 3.

Fig. 1.

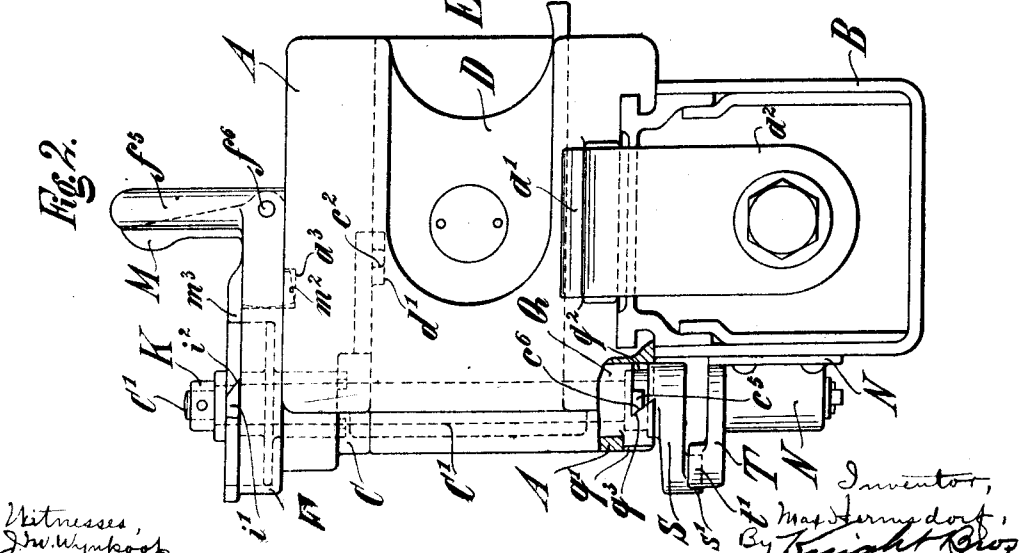


Fig. 2.

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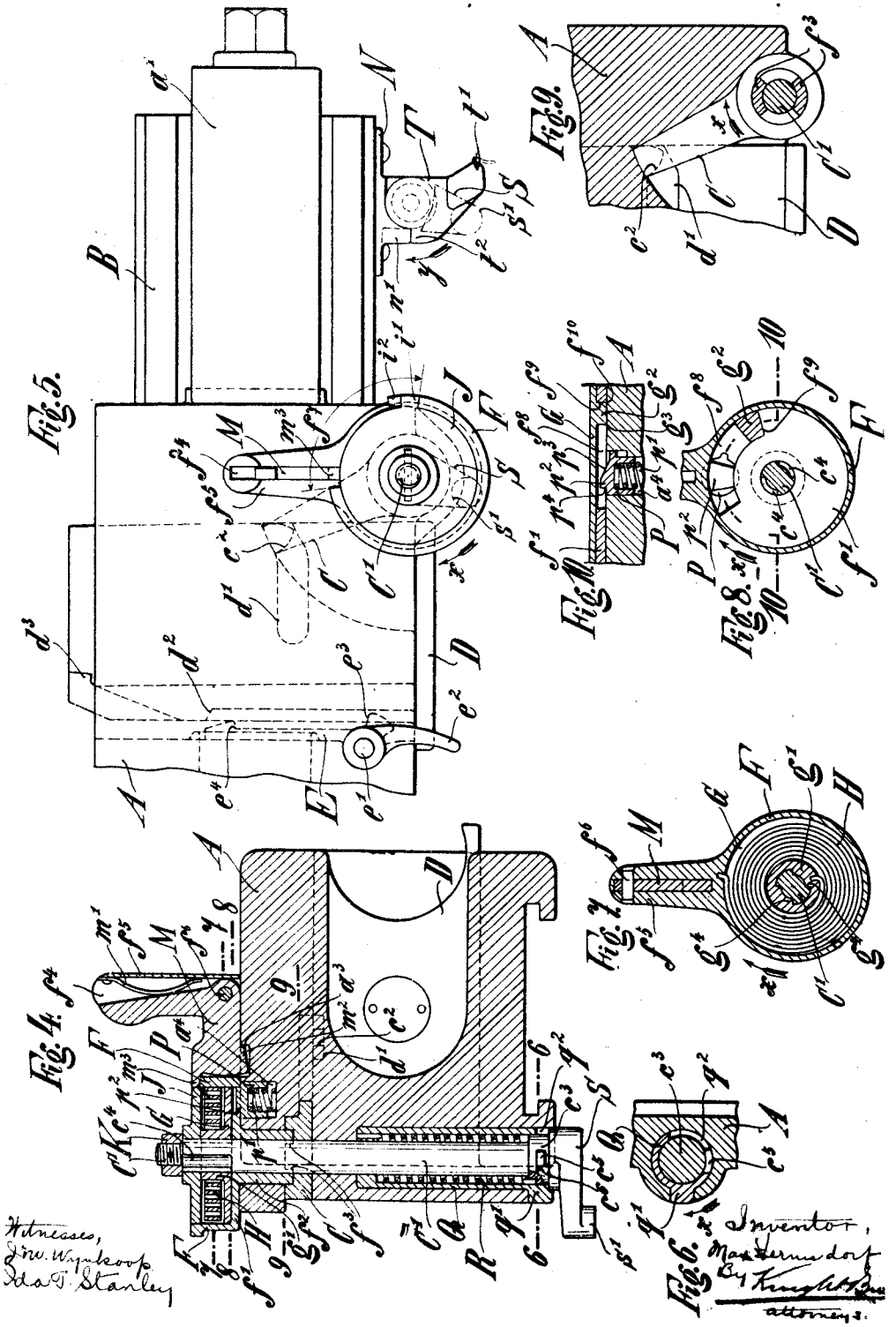
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3 SHEETS—SHEET 2.



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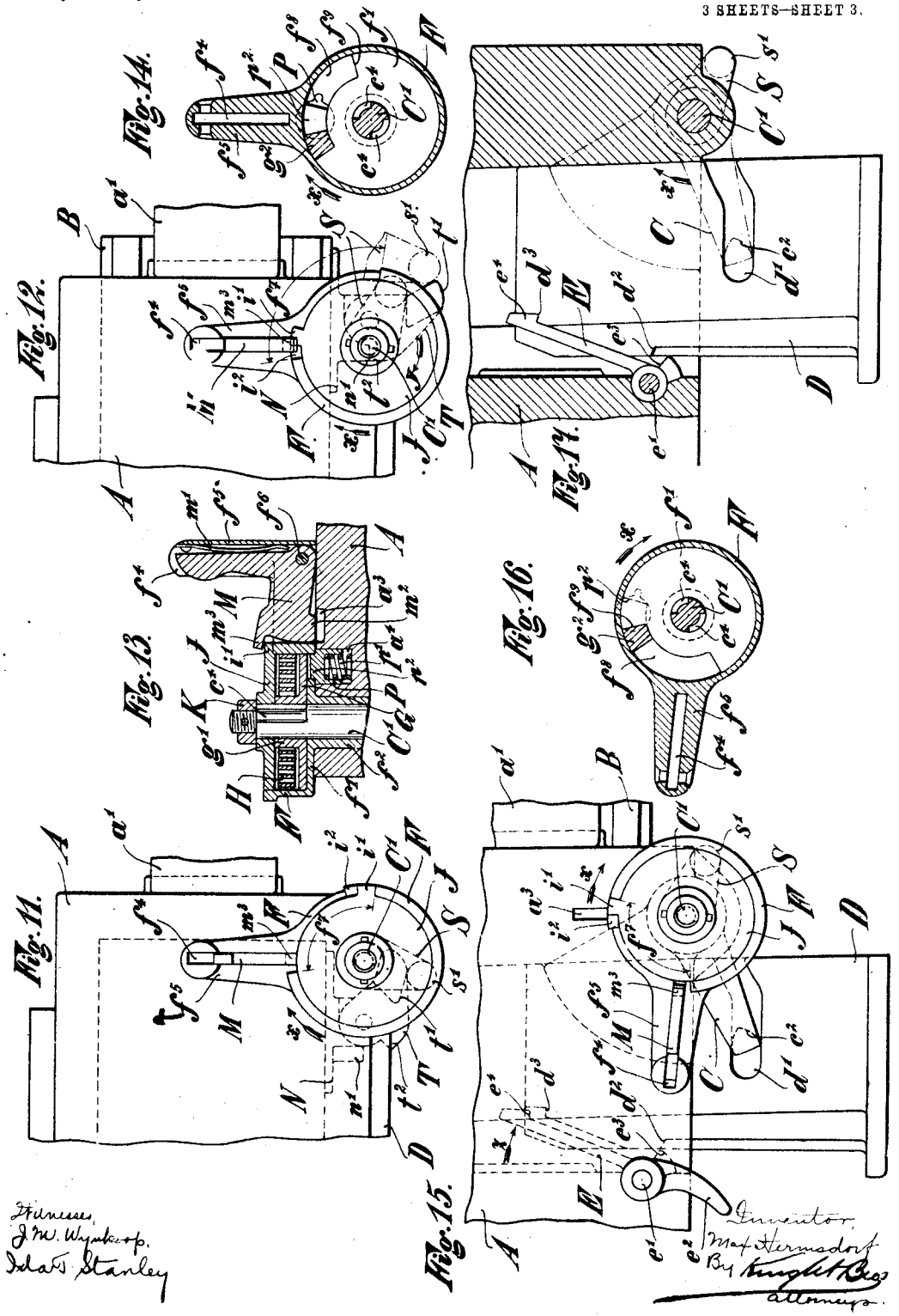
BARREL RECOIL GUN.

APPLICATION FILED FEB. 4, 1911.

1,066,814.

Patented July 8, 1913.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

MAX HERMSDORF, OF ESSEN-ON-THE-RUHR, GERMANY, ASSIGNOR TO FRIED. KRUPP AKTIENGESELLSCHAFT, OF ESSEN-ON-THE-RUHR, GERMANY.

BARREL-RECOIL GUN.

1,066,814. Specification of Letters Patent. Patented July 8, 1913.

Application filed February 4, 1911. Serial No. 606,593.

To all whom it may concern:

Be it known that I, MAX HERMSDORF, a subject of the Emperor of Germany, and a resident of Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Barrel-Recoil Guns, of which the following is a specification.

This invention relates to that class of barrel recoil guns which have, in addition to the running out gear, two accumulators one of which opens, and the other closes the breech mechanism.

The invention consists, first and foremost, in such an arrangement of the accumulators that the gun barrel is able to stress both of the accumulators when the gun runs out.

A constructural example of the subject matter of the invention is shown in the drawing in which—

Figure 1 is a side elevation, partially in section, of those parts of the gun affected by the present invention. The various parts are shown in the position which they assume when the gun barrel is in the firing position and the breech mechanism is closed. Fig. 2 is the rear elevation corresponding to Fig. 1, and partially in section; Figs. 3 and 4 show respectively sections on the lines 3—3 and 4—4 of Fig. 1 looking from the right; Fig. 5 is the plan view of Fig. 1; Fig. 6 is a section on the line 6—6 of Fig. 4, looking from above; Figs. 7 to 9 show respectively sections on the lines 7—7, 8—8 and 9—9 of Fig. 4, looking from above; furthermore Fig. 10 shows a section on the line 10—10 of Fig. 8, Fig. 11 is a part plan showing the parts in the position which they assume when the gun barrel has executed a certain portion of the recoil. Fig. 12 is a similar plan showing the various parts in the position which they assume when the gun barrel has executed a certain portion of the running out movement. Fig. 13 shows a portion of Fig. 4 with the parts in the position corresponding to Fig. 12, Fig. 14 is a similar view to Fig. 8, likewise with the parts in the position corresponding to Fig. 12, Fig. 15 is a plan which shows the various parts in the position they assume when the gun barrel is in the firing position and the breech mechanism wide open, Fig. 16 is a similar view to Fig. 8 with the parts in the position corresponding to Fig. 15, and Fig. 17 is a horizontal section which represents the parts in the position which they assume immediately before loading.

The gun barrel A is mounted to slide upon the slide carrier B by means of the slide a^1 and is connected by the spur a^2 on the slide to the recoil brake and running out gear, (both of which are not shown). The slide carrier B projects out beyond the front face of the breech of the barrel when the gun barrel is in the firing position. The breech mechanism is a horizontal wedge breech mechanism. The breech mechanism is opened and closed by a thrust lever C, which rotates upon a shaft C^1 mounted vertically in the breech end of the gun barrel. The thrust lever C engages by means of a cam c^2 in a thrust cam groove d^1 in the breech wedge D. The ejector E is mounted upon a shaft e^1 carried in the breech end of the gun barrel, see Figs. 1, 3, 15 and 17. It is provided with lugs e^3 which are adapted to coöperate in such a way with shoulders d^2 arranged on the breech wedge D that the ejector E is rocked at the end of the outward movement of the breech wedge, see Fig. 15. Upon the end of the ejector shaft e^1 which projects upward from the breech end of the gun barrel is fixed a lever e^2, by the rotation of which the ejector can be rocked by hand when the breech mechanism is open. The ends of the ejector are provided with hook-shaped projections e^4, see particularly Fig. 17. When the ejector is swung out of its position of rest these hooks can swing into recesses d^3 in the breech wedge D.

Upon the upper end of the shaft C^1 is mounted a revolving drum F which is open at the top, and the bottom f^1 of which bears against the breech end of the gun barrel. Upon the bottom f^1 of the drum is provided a downwardly extending tubular projection f^2, see particularly Fig. 4, which projects into a recess turned in the breech end of the barrel and coaxial with the shaft C^1. On this projection are two claws f^3, see also Fig. 9, which engage in recesses in the thrust lever C (which rotates on the shaft C^1), and connect it to the drum F so as to be incapable of rotating with respect to the said drum. Upon the bottom f^1 of the drum F lies a disk G, which is provided on its upper side with a hub-like projection g^1. This projection has internal ribs g^4, see Fig. 7, which engage in grooves c^4, see Figs. 4 8,

13, 14 and 16, in the shaft C^1, by means of which the disk is so connected to the shaft as to be incapable of rotation thereon but can be drawn off said shaft by sliding the disk in an upward direction.

Around the hub-like projection g^1 is arranged a spiral spring H, which is attached by one end to the drum F and by the other end to the projection g^1, see Fig. 7. The spring H, which is intended to open the breech, is introduced with initial stress and tends to rotate the disk G and the shaft C^1 in the direction of the arrow x, and the drum F and the thrust lever C in the opposite direction. As is hereinafter more fully described, the disk G causes the stressing of the spring H. Above the spring H there lies in the drum F upon the upper end of the projection g^1 of the stressing disk G, a disk J which covers in the drum F at the top and is connected to the shaft C^1 so as to be incapable of rotating on said shaft but capable of moving longitudinally thereon in the same way as the stressing disk G. The disk J is held by a nut K, which is mounted on the shaft C^1; it carries on its cylindrical wall a projection i^1 with a beveled portion i^2, see Figs. 2, 5, 11 to 13 and 15. The cylindrical wall of the drum F is provided at the upper edge for a portion of its periphery with a recess f^7, see Figs. 5, 11, 12 and 15, in which the projection i^1 on the disk J can move.

Between the drum F and the breech end of the gun barrel is interposed a catch. One part of this catch is formed by a locking lug m^2 on a two-armed locking pawl M which is controlled by a spring m^1 and is carried on a pin f^6 in a slot f^4 in a lateral arm f^5 of the drum F made in the form of a handle. The other part of the catch consists of a recess a^3 provided for the locking lug m^2 in the breech end of the gun barrel. The spring m^1 tends to hold the locking lug m^2 in engagement with the recess a^3. The locking pawl M carries a lug m^3, which is intended to coöperate with the projection i^1 on the disk J. A second catch is interposed between the stressing disk G non-rotatably connected to the shaft C^1, and the breech end of the gun barrel. One part of this catch is formed by an annular sector-shaped projection g^2 mounted on the underside of the stressing disk G, see Figs. 8, 10, 14 and 16. This projection enters an annular sector-shaped recess f^8 in the bottom f^1 of the drum. The other part of the second catch consists of a bolt P, which is controlled by a spring p^1 and is mounted to move longitudinally but not rotate in an aperture a^4 in the breech end of the barrel, see particularly Figs. 4, 10 and 13. This bolt has an annular sector-shaped head p^2, see also Figs. 8, 14 and 16, which can project into the recess f^8 in the bottom f^1 of the drum and has an inclined face p^3 and a locking face p^4, see Fig. 10. The inclined face p^3 is intended to coöperate with one lower edge g^3 of the edges of the projection g^2 on the stressing disk G and with the lower edge f^{10} of one of the radial stop faces f^9 at the end of the recess f^8 in the bottom f^1 of the drum in a manner to be more fully described hereinafter.

Underneath the thrust lever C there is arranged in the breech end of the gun barrel coaxially with the shaft C^1 a sleeve Q, see Figs. 4 and 6, which by means of a lug q^1 situated thereon and engaging in the breech end of the gun barrel, see also Figs. 1, 2 and 6, is prevented from rotating relatively to the gun barrel. The sleeve Q surrounds a helical spring R, the upper end of which is attached to the sleeve Q and the lower end thereof to a collar c^3 on the shaft C^1. The spring R, which serves to close the breech mechanism, is introduced with initial stress and tends to rotate the shaft C^1 and the disks G and J non-rotatably connected thereto in the direction of the arrow x. The collar c^3 on the shaft C^1 has a projection c^5, see Figs. 2, 4 and 6, which enters a recess q^2, see particularly Fig. 6, in the sleeve Q and, when the parts are in the position of rest, bears under the action of the spring R with its inclined face c^6 against the correspondingly inclined stop face q^3 (see Fig. 2) of the recess q^2.

Upon the lower end of the shaft C^1 is rigidly fixed a lever S which carries a downwardly extending stop s^1. At the rear end of the slide carrier B a lever T, see particularly Figs. 1, 2 and 5, is so mounted on a plate N that it can rock about an axis which is parallel to the axis of the shaft C^1. The lever T is provided with an upwardly extending stop t^1 and a lateral stop t^2. A helical spring V, see Fig. 1, tends to hold the lever T in the position more particularly shown in Fig. 5, in which position the stop t^2 bears against a stop n^1 on the plate N. The stops s^1, t^1 are for the purpose of coöperating in such a manner that when the gun barrel recoils the stop t^1 can move out of the way of the stop s^1, see Fig. 11, and when the gun runs out, the stop t^1 can cause, through the medium of the stop s^1, a rotation of the arm S (and consequently also of the shaft C^1), into the position shown in Fig. 12.

Immediately before the shot is fired the various parts assume the position shown in Figs. 1 to 10, the breech mechanism being closed. The cam c^2 of the thrust lever C lies against the rear wall of the hole in the breech wedge, see Figs. 5 and 9, and the springs H and R are let down to the extent of their initial tension. The catch m^2 a^3 is thrown into operation, so that the drum F and the thrust lever C non-rotatably con-

nected to it by the claws f^3 on the projection f^2 of the drum, are prevented from rotating in a direction contrary to the direction of the arrow x. The projection g^2 on the stressing disk G is held by the spring H in contact with the stop face f^9 of the recess f^8 provided in the bottom f^1 of the drum, see Figs. 8 and 10, so that the stressing disk G is prevented from rotating in the direction of the arrow x through the medium of the drum F which is itself prevented from rotating. As furthermore the stressing disk G is non-rotatably connected to the shaft C^1, this shaft also together with the lever S mounted thereon are prevented from rotating in the direction of the arrow x. In addition to this the shaft C^1 is prevented from rotating in this direction because the projection c^5 on its collar c^3 bears against the stop face q^3 of the recess q^2 provided in the sleeve Q. After the shot has been fired, the gun barrel A recoils with the slide a^1 on the slide carrier B. When this happens the stop s^1 on the lever S, strikes, (when the latter has reached the position indicated by dot and dash lines in Fig. 5) against the stop t^1 on the lever T. The stop s^1, then sliding along the stop t^1, then throws the lever T over against the action of the spring V into the position shown in Fig. 11, because, as has just been explained, the lever S is prevented from rotating in the direction of the arrow x. As the gun continues to recoil the stop s^1 releases the stop t^1, so that the lever T returns to its position of rest under the action of the spring V, the stop t^2 on the lever T being again brought into contact with the stop n^1 on the bearing N. When the gun barrel A runs out the stop s^1 again strikes against the stop t^1, see the position of the lever S indicated by dot and dash lines in Fig. 12. From this moment, as the stop t^2 now bears against the stop n^1 and does not permit of rotation of the lever T in the direction of the arrow y, see Figs. 5 and 12, the lever S will be rotated through the medium of the stops s^1, t^1 in a direction opposite to that of the arrow x into the position indicated by dotted lines in Fig. 12. With the lever S are rotated the shaft C^1 and the stressing disk G non-rotatably connected thereto. During this time the springs R and H are stressed, and the projection c^5 on the shaft C^1 moves in the recess q^2 in the sleeve Q. When the stressing disk G rotates its projection g^2 moves in the recess f^8 in the bottom of the drum f^1 out of the position shown in Figs. 8 and 10 into the position shown in Fig. 14. When this takes place the coöperation of the edge g^3 of the projection g^2 with the inclined face p^3 of the bolt head p^2, causes this latter to be pressed against the action of the spring p^1 into the aperture a^4 in the gun barrel. Immediately the projection g^2 has slid over the bolt head p^2, that is to say has arrived in the end position shown in Fig. 14, the bolt head p^2 again emerges from the aperture a^4 under the action of the spring p^1 and places itself with its locking face p^4 in front of the projection g^2. The bolt P then prevents the stressing disk and with it the shaft C^1 from rotating themselves back into their original position under the action of the now strongly stressed springs H and R. With the shaft C^1 has also rotated the disk J non-rotatably connected thereto, and the instant in which the stressing disk G has been secured by its projection g^2 and the bolt P, the projection i^1 provided with the inclined face i^2 and situated on the disk J, has passed under the lug m^3 on the locking pawl M and has lifted the locking lug m^2 out of the recess a^3 in the gun barrel against the action of the spring m^1, see Figs. 12 and 13. By this means the drum F is unlocked from the gun barrel so that the spring H can now expand and rotate the drum F in the opposite direction to that of the arrow x until the position shown in Fig. 15 is reached. With the drum F is rotated the thrust lever C connected thereto non-rotatably by the claws f^3, and by this means the breech mechanism opened (see Fig. 15). On the above mentioned movement of the drum F, during which the disk J non-rotatably connected to the shaft C^1 has remained at rest, the lug m^3 on the pawl M which takes part in the rotary movement of the drum F, has moved out of engagement with the projection i^1 on the disk J. The locking lug m^2 on the pawl M has consequently, during the rotation of the drum moved into contact with the upper face of the breech end of the gun barrel under the action of the spring m^1. Toward the end of its outward movement the breech wedge D strikes with its stops d^2 against the stops e^3 on the ejector E and sets the latter in sudden rotation in the direction of the arrow z, see Fig. 15, so that the ejector ejects the cartridge case and moves into the position shown in Fig. 15. While the opening spring H is expanding and the drum F has rotated in the opposite direction to that of the arrow x, the closing spring R has remained stressed, because the stressing disk G and the shaft C^1 non-rotatably connected thereto were prevented from rotating in the direction of the arrow x through the medium of the projection g^2 on the stressing disk and the bolt P. Toward the end of the rotary movement of the drum F caused by the opening spring H, the lower edge f^{10} of the top face f^9 on the bottom f^1 of the drum, strikes against the inclined face p^3 on the bolt head p^2. Hereupon the bolt head p^2 is pushed into the aperture a^4 in the gun barrel against the action of the spring p^1 through the coöperation of the edge f^{10} with the inclined face p^3, passing finally right under the bottom f^1 of

the drum (see Fig. 16). The projection g^2 on the stressing disk G has then come in contact with the stop face f^9 in the recess f^8. At this moment the breech wedge is situated in its outermost open position (see Fig. 15). At the same time the projection g^2 on the stressing disk G has been brought out of engagement with the locking face p^4 on the bolt head p^2 by the depression of the latter into the recess a^4 in the breech end of the barrel, so that the connection between the disk G and the breech end of the gun barrel is broken and the closing spring R can now expand. In expanding it rotates the stressing disk G through the medium of the shaft C^1 in the direction of the arrow x.

The projection g^2 on the stressing disk G carries the drum F which latter is rotated in the direction to close the breech mechanism through the medium of the claws f^3 on the thrust lever C. These movements are however interrupted, when the walls of the notches d^3 which are situated in the breech wedge D and run transversely to the direction of movement of the latter, strike against the hook-shaped projections e^4 on the ejector. At this moment the part assume the position shown in Fig. 17, *i. e.*, the loading position. If now the gun be loaded, the ejector E will be rocked so far by the rim of the cartridge case that its projections e^4 are brought out of engagement with the notches d^3 of the breech wedge D. There is therefor no longer any hindrance to the expansion of the closing spring R, so that by means of the shaft C^1, the stressing disk G, the projection g^2 and the drum F it rotates the thrust lever C in the direction of the arrow x and effects the closing of the breech mechanism. With the shaft C^1 and the drum F rotates also the disk J, so that its projection i^1 remains out of engagement with the lug m^3 of the pawl M. When these movements occur, the projection g^2 of the stressing disk G has slid over the bolt head p^2, and the bolt head has again passed under the action of the spring p^1 into the recess f^8 in the bottom f^1 of the drum. Furthermore the locking lug m^2 on the pawl M has moved along on the upper face of the breech end of the gun barrel up to the notch a^3 and has finally dropped into the notch again under the action of the spring m^1. The parts then again assume the position shown in Figs. 1 to 10.

If the breech mechanism is to be closed without the gun being previously loaded, the projections e^4 on the ejector E are brought out of engagement with the notches d^3 in the breech wedge D by rotating the ejector E by means of the lever e^3.

If the breech mechanism is to be worked by hand, the handle f^5 on the drum F is taken hold of, whereby the locking lug m^2 on the locking pawl M is brought out of engagement with the notch a^3. The handle f^5 is then rotated in the opposite direction to that of the arrow x (Fig. 5). This opens the breech mechanism through the medium of the thrust lever C which is non-rotatably connected to the drum F by the claws f^3. The stressing disk G and the shaft C^1 rotate with the drum F through the medium of the stop face f^9 on the recess f^8 and the projection g^2, so that the closing spring R is stressed. The stress of the opening spring H does not change here as the stressing disk G and drum F rotate simultaneously by the same amount. At the end of the opening movement of the breech mechanism the parts assume the position shown in Figs. 15 and 16. The locking of the breech mechanism in the loading position (through the ejector E) and the closing of the breech mechanism under the action of the spring R take place in the manner above described.

If it be desired to separate from the gun barrel the parts mounted thereon and serving to automatically open and close the breech mechanism, the nut K is loosened. The drum F together with the pawl M, the disks G and J and the spring H can then be at once drawn upward off the shaft C^1. The spring H retains however its initial stress because it is so attached to the drum F and the stressing disk G, that it tends to rotate them relatively to the drum in the direction of the arrow x, and such rotation of the stressing disk G is prevented by its stop g^2 bearing against the stop face f^9 on the bottom f^1 of the drum. On the other hand after loosening the nut K, the shaft C^1 together with the sleeve Q and the spring R can be withdrawn out of the breech end of the gun barrel, without the shaft C^1 becoming detached from the sleeve Q and consequently the tension or stress of the spring R is maintained. This is so because these parts are retained in their normal position by the spring R which forces the inclined face c^6 of the projection c^5 on the shaft C^1 into contact with the correspondingly beveled stop face q^3 in the recess q^2 of the sleeve Q. The two accumulators which effect the opening and closing of the breech mechanism can therefore be quickly and easily removed from the gun barrel and, as is manifest without any further explanation, be likewise remounted on the gun barrel again, without its being necessary to stress or let down the springs H and R.

I claim:—

1. A recoil gun having a recuperator and two accumulators, one of which accumulators operates to open and the other to close the breech, and means whereby both accumulators are tensioned during the running-out movement of the gun barrel.

2. A recoil gun having a recuperator, two accumulators, one of which operates to open

and the other to close the breech, and means simultaneously tensioning both accumulators by the running-out movement of the gun barrel, comprising a pair of coöperating abutments, one of which is mounted on the gun barrel and the other on the gun mount.

3. A recoil gun having a recuperator, two accumulators, one of which operates to open and the other to close the breech, and means simultaneously tensioning both accumulators, comprising a tensioning abutment having connections through which it tensions the accumulators, and a coöperating abutment on a non-recoiling part of the gun, resisting the tensioning abutment in the direction to cause tensioning of the accumulators, but yielding thereto in the opposite direction.

4. In a barrel recoil gun, a lever for actuating the breech block, a shaft concentric with the fulcrum of said lever, a recuperator, two torsional spring-accumulators adapted respectively to open and close the breech, the springs of these accumulators being mounted co-axially with said shaft and tensioned by the running-out movement of the gun barrel, and a connection through which said shaft is rotated in the direction to tension them, by longitudinal movement of the gun barrel.

5. In a barrel recoil gun, a lever for opening and closing the breech, an accumulator adapted to impart opening movement to said lever, a shaft for tensioning said accumulator, by rotation in one direction on the running-out movement of the gun barrel, a connection through which said shaft is adapted to impart closing movement to the lever by rotation in the opposite direction and an accumulator tensioned on the running-out movement of the gun barrel and adapted to rotate said shaft in said opposite direction.

6. In a barrel recoil gun, a lever for opening and closing the breech, an accumulator adapted to impart opening movement to said lever, a shaft for tensioning said accumulator, by rotation in one direction, a connection through which said shaft is adapted to impart closing movement to the lever by rotation in the opposite direction, an accumulator adapted to rotate said shaft in said opposite direction, and means for rotating said shaft on the running-out movement of the gun barrel in the direction to tension both accumulators.

7. In a barrel recoil gun, a lever adapted to open and close the breech, an accumulator spring for opening the breech, a drum having connection with the lever, and with one end of the opening spring, a shaft having connection with the other end of the opening spring whereby it is adapted to tension said spring, and also having a connection whereby it is adapted to move the drum in the direction to impart closing movement to the lever, and an accumulator connected with said shaft and adapted to rotate the same in the direction to develop said closing movement, means on the shaft and on a non-recoiling part of the gun for rotating said shaft during the running-out movement of the gun barrel in the direction to tension both accumulators.

8. In a barrel recoil gun, a lever adapted to open and close the breech, an accumulator spring for opening the breech, a drum having connection with the lever and with one end of the opening spring, a shaft having connection with the other end of the opening spring whereby it is adapted to tension said spring, and also having a connection whereby it is adapted to move the drum in the direction to impart closing movement to the lever, and an accumulator connected with said shaft and adapted to rotate the same in the direction to develop said closing movement; said shaft carrying a crank arm, and a stop being mounted upon a non-recoiling part of the gun, in position to engage said crank arm and rotate the shaft in the direction for tensioning both accumulators.

9. In a barrel recoil gun, a lever adapted to open and close the breech, an accumulator spring for opening the breech, a drum having connection with the lever and with one end of the opening spring, a shaft having connection with the other end of the opening spring whereby it is adapted to tension said spring, and also having a connection whereby it is adapted to move the drum in the direction to impart closing movement to the lever, and an accumulator connected with said shaft and adapted to rotate the same in the direction to develop said closing movement, the closing accumulator comprising a coil spring having connection at one end with the tensioning shaft and a sleeve surrounding said spring and connected with the other end thereof and non-rotatably connected with the breech of the gun.

10. In a barrel recoil gun, breech actuating mechanism, accumulators adapted respectively to impart opening and closing movements to the breech actuating mechanism, tensioning means common to both said accumulators and actuated by a movement of the gun barrel incident to firing, a ratchet adapted to hold said tensioning means in the position to which it is moved, and means releasing said ratchet, actuated by the opening movement of a part through which the opening accumulator imparts opening movement to the breech, whereby the tensioning means is permitted to return to its initial position under the action of the breech closing accumulator.

11. In a barrel recoil gun, breech actuat-

ing mechanism, accumulators adapted respectively to impart opening and closing movement to the breech actuating mechanism, a tensioning shaft common to both accumulators, means whereby said tensioning shaft is rotated by a movement incident to the firing of the gun, a ratchet adapted to hold the shaft in tensioning position, a drum through which the opening accumulator imparts opening movement to the breech mechanism and means carried by said drum adapted to release the ratchet at the end of the breech opening movement, whereby the shaft is then free to return to initial position under the action of the closing accumulator.

12. In a barrel recoil gun, breech opening and closing means, an accumulator for imparting opening movement thereto, a tensioning means for said accumulator, a ratchet resisting opening movement until the tensioning movement is completed and means carried by said tensioning means adapted to release said ratchet when said tensioning movement is completed.

13. In a barrel recoil gun, a breech opening and closing means, a drum through which opening movement is imparted to said means, a ratchet carried by said drum for resisting opening movement thereof, an accumulator adapted to impart opening movement to said drum, a shaft adapted to tension said accumulator, and a disk carried by said shaft and adapted to release said ratchet when the shaft has completed its tensioning movement, whereby the opening connection can respond to the opening tension of said accumulator.

14. In a barrel recoil gun, a tensioning shaft, two accumulators, each connected at one end to said shaft and adapted to be simultaneously tensioned thereby, breech actuating means, a connection through which one of said accumulators imparts opening movement to said breech mechanism, a ratchet restraining the opening movement, a releasing means carried by the shaft adapted to release the opening connection after the tensioning movement is complete, a ratchet adapted to restrain the tensioning shaft in the position to which it is rotated to tension the accumulators, means carried by the opening connection for disengaging said shaft retaining ratchet when the opening movement is complete, a means carried by the shaft and engaging the breech actuating mechanism through which the shaft imparts closing movement to the breech mechanism, when the shaft is rotated backward, and a connection between the second accumulator and the gun, whereby it is adapted to impart backward or breech closing movement to the shaft.

15. In a barrel recoil gun, a breech opening and closing element, a drum through which said element is rotated in opening and closing directions, a locking device for resisting the movement of said drum in the direction of opening the breech, comprising a ratchet having a toe adapted to enter a seat in a fixed part of the gun barrel and a projection through which said ratchet may be lifted, an accumulator spring having connection at one end with the drum, through which it may rotate the drum when the spring is under tension, a shaft through which said spring is placed under tension and a disk carried by said shaft and having a projection adapted to engage the projection on the ratchet when the tensioning movement of the shaft is complete and raise the ratchet to release the drum and permit the latter to receive opening movement under the action of the spring.

16. In a barrel recoil gun, a breech opening and closing element, a drum through which said element is moved, an accumulator spring connected at one end to said drum and adapted to impart movement thereto in the direction to open the breech, a tensioning shaft, a tensioning disk non-rotatably connected to said shaft and having connection with the other end of said opening spring, and a ratchet carried by a fixed part of the gun and adapted to hold the disk and through it the shaft in tensioning position; said ratchet being engaged by the drum at the completion of the opening movement and released so that the shaft may rotate in the direction opposite to tensioning during the closing movement of the breech.

17. In a barrel recoil gun, a member through which opening movement is imparted to the breech closure, an accumulator adapted to impart opening movement to said member, a shaft adapted to tension said accumulator by the running-out movement of the gun barrel in the direction to develop said opening movement, a second accumulator having connections with said shaft and with a fixed part of the gun which adapts it to be tensioned by said shaft, simultaneously with the first named accumulator, a handle connected with the opening member through which it may be actuated by hand, and a connection between said opening member and the tensioning shaft which causes said memer and shaft to move together and the second accumulator to be tensioned when the breech is opened by hand.

18. In a barrel recoil gun, a breech opening and closing member, an accumulator adapted to impart opening movement, an accumulator adapted to impart closing movement, a shaft for tensioning both said accumulators, a drum through which opening and closing movements are imparted to the breech closure, a tensioning disk through

which tensioning movement is imparted to the opening spring, a projection on said tensioning disk extending through the wall of the drum and having a limited movement therein, a clutch bolt mounted in the gun barrel in position to engage the projection on the tensioning disk when the tensioning movement is complete and means carried by the drum adapted to actuate said bolt when the opening movement of the breech closure is completed and thereby release the tensioning shaft and permit it to return to initial position under the action of the breech closing accumulator.

19. A recoil gun having a recuperator, a breech opening accumulator and breech closing accumulator, and means whereby both accumulators are tensioned during the running-out movement of the gun barrel, a hand lever adapted to open and close the breech, said breech opening accumulator comprising a torsion spring, a drum having connection with said lever and with one end of said torsion spring, a shaft, a disk having rotating connection with said shaft, said spring, drum and disk being so mounted on said shaft that they together may be removed from said shaft with the spring under tension.

20. A recoil gun having a recuperator, a breech opening accumulator and breech closing accumulator, and means whereby both accumulators are tensioned during the running-out movement of the gun barrel, a hand lever adapted to open and close the breech, said breech closing accumulator comprising a torsion spring, a shaft and a sleeve, said spring, shaft and sleeve being adapted to be together removed from the gun with the said spring under tension.

The foregoing specification signed at Barmen, Germany, this 12th day of January, 1911.

MAX HERMSDORF. [L. S.]

In presence of—
CHAS. J. WRIGHT,
ALFRED HENKEL.