Dec. 29, 1925. 1,568,005

C. SUTTER

ACCELERATING DEVICE FOR AUTOMATIC FIREARMS

Filed June 22, 1925 2 Sheets-Sheet 1

Fig. 1.

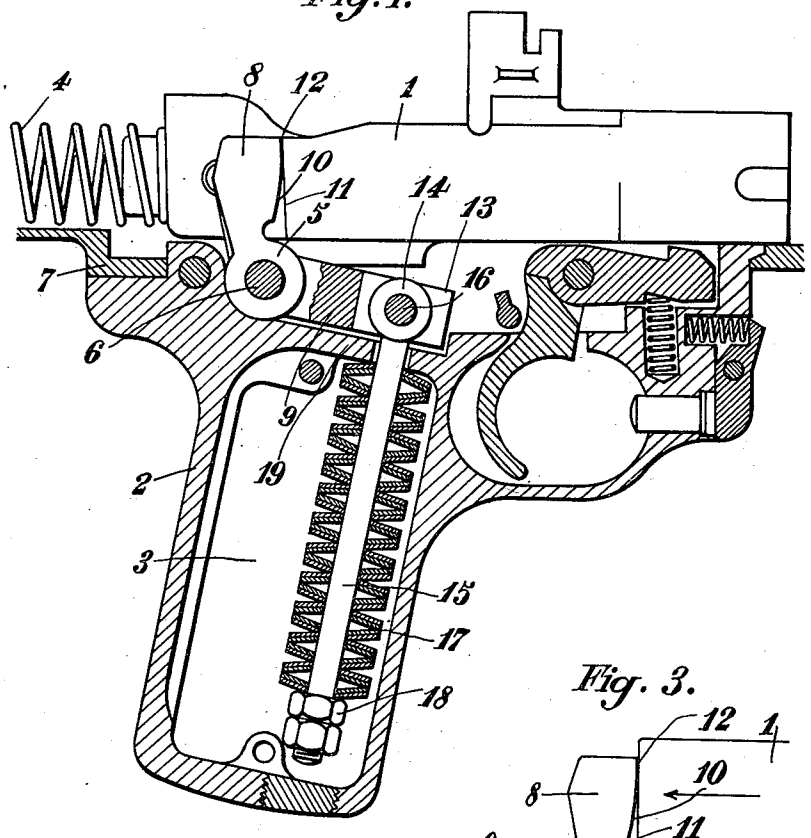
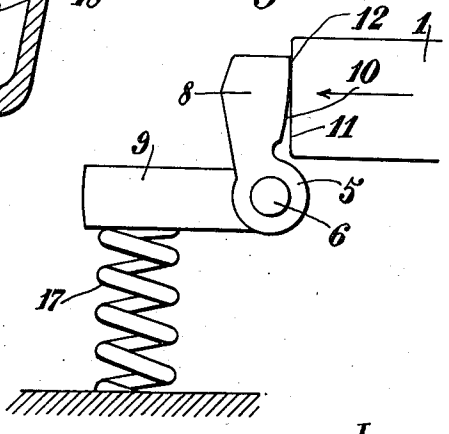


Fig. 3.



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Fig. 2.

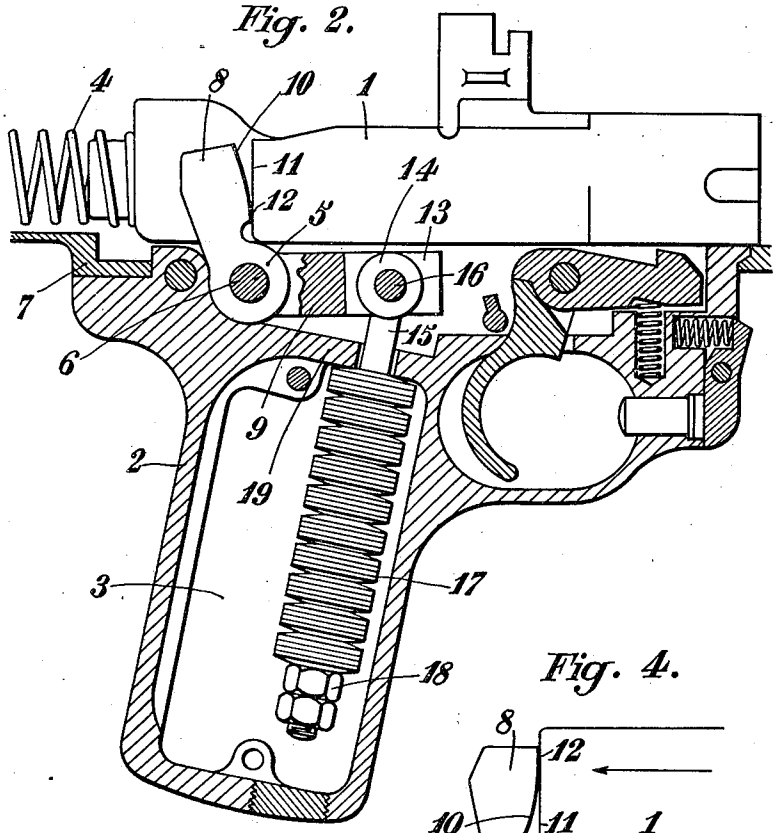
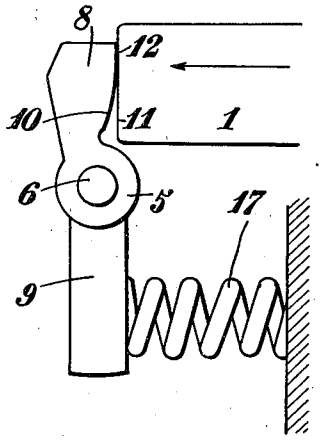


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ACCELERATING DEVICE FOR AUTOMATIC FIREARMS.

Application filed June 22, 1925. Serial No. 38,806.

To all whom it may concern:

Be it known that I, CHARLES SUTTER, a citizen of the French Republic, and residing at 42 Rue Emile Zola, Suresnes, Seine, France, have invented an Accelerating Device for Automatic Firearms, of which the following is a specification.

The present invention relates to an accelerating device for automatic firearms, comprising essentially a spring which stores up the energy imparted thereto by the firing mechanism at the end of its rearward stroke, said spring, which for the sake of clearness and conciseness, is hereinafter referred to as the accelerating spring, then gives back this energy, at the commencement of the forward stroke of the firing mechanism, at the same time causing an acceleration of the movement of this latter, this movement being effected by any known recuperating device such as a spring, a pneumatic or hydraulic apparatus, or the like.

The present invention is further characterized by the fact that there is interposed between the actuating mechanism connected to the firing mechanism of the automatic firearm, the rate of fire of which is to be increased, and the accelerating spring, a pivoting lever by the intermediary of which the said mechanism, on the one hand, at the end of its rearward stroke compresses the spring and, on the other hand, at the commencement of the forward stroke receives the energy stored up in this spring.

In accordance with the invention the pivoting lever is provided with two arms: a driving arm upon which acts the driving element and a driven arm which is connected to the accelerating spring.

According to another characteristic of the invention, the driving arm of the pivoting lever has an incline upon which the actuating member acts, the profile of this incline being such that no friction takes place between said member and the driving arm and that, on the other hand, the point at which the force transmitted by this member is applied to the pivoting lever approaches the axis of this latter according as this lever, under the influence of the said force, pivots and compresses the accelerating spring.

It results from these essential characteristics of the device according to the invention that it is possible to mount the accelerating spring, the geometric axis of which may be directed in any manner which depends only upon the location of the two arms of the pivoting lever, in a very accessible position, for example in the trigger guard of the firearm. The mounting and adjustment thereof will consequently be very easy.

The device according to the invention also enables the movement of the firing mechanism to be accelerated to a high degree. In this way, the ratio of the stroke during which the accelerating spring is compressed and of the stroke corresponding to the driving member is a function of the lengths of the driving and driven arms of the pivoting lever. In consequence by suitably choosing this ratio it is possible to obtain a rapid compression of the spring. Moreover the point of application of the force transmitted by the driving member approaches, during the pivoting of the lever, to the axis of this latter and the result is that for the same movement of the actuating member there will take place an angular movement of the pivoting lever which is greater at the end of the compression of the spring than at its commencement. On the other hand the accelerating spring offers a resistance which becomes greater and greater as the spring is compressed. In consequence the actuating member will be obliged to overcome a resistance which, for these different reasons, will increase very rapidly and the rearward movement of this member will be checked very rapidly; and the time of the slowing down of this movement will therefore be insignificant. Further the action of this member upon the spring takes place abruptly and therefore causes compression of the spring which by reason of the better utilization of the momentum inherent in the driving member will enable a great acceleration of the movement of the firing mechanism to be obtained at the start of the forward stroke.

It will be understood that the pivoting lever may be constructed in a variety of ways.

According to one of the forms of execution the driving and driven arms of the pivoting lever are arranged angularly, the driven arm being directed towards the front

of the weapon and being connected to the spring by a rod upon which is mounted the said spring which is preferably located in the trigger guard of the weapon.

According to a certain form of execution of the invention the driving and driven arms of the pivoting lever are substantially in a prolongation one of the other.

The invention has been shown diagrammatically and merely by way of example in the accompanying drawings. in which:

Fig. 1 is a sectional elevation showing the accelerating device according to the invention in the position in which a reciprocating piston is effecting its rearward stroke and is on the point of acting upon the pivoting lever.

Fig. 2 is a view similar to Fig. 1 but in which the piston has reached the rearward limit of its stroke after having caused the lever to pivot and after having compressed the accelerating spring.

Figs. 3 and 4 show modified forms of execution of the pivoting lever.

In the drawing, 1 designates the piston of the automatic firearm, this piston being given a reciprocating movement, the extreme rearward position of which is shown in Fig. 2; and 2 designates the trigger guard which has a recess 3.

The accelerating device, which in Figs. 1 and 2 is shown in its preferred form of construction, comprises a bell crank lever 5 pivoting about a shaft 6 fixed upon the frame 7 of the firearm, this lever 5 being provided with two arms; a driving arm 8 and a driven arm 9. The driving arm 8 is provided on its engaging face with an incline 10 upon which can act a shoulder 11 formed on the piston 1 when this latter moves towards the rear. The profile of this incline is such that a rolling engagement between the shoulder 11 upon the arm 8 takes place, without there being any sliding friction between this shoulder, which is given a lateral movement, and the arm 8 which pivots about the axis 6, this profile moreover enabling the point 12 at which the said shoulder bears against the incline 10 to approach the shaft 6, thus decreasing the effective levers, according as in its rearward movement this shoulder 11 causes the lever 5 to pivot.

At the extremity of the driven lever 9 there is provided a fork 13 in which is engaged the head 14 of the rod 15 pivoted upon the axis 16 mounted in the fork 13. About this rod 15 there is arranged the accelerating spring 17 which can be constituted either by the juxtaposition of "Belleville" washers or by a helical spring or again by a similar device. This spring 17, which is held upon the rod 15 (this latter being mounted in the recess 3 of the trigger guard 2) by means of nuts 18 which are screwed on the lower portion of this rod, bears at its upper portion against an abutment 19 provided in the trigger guard 2. Bearing against this abutment the accelerating spring 17 has always the tendency to expand and consequently to bring back the lever 5 into the position which it occupies in Fig. 1 when this lever has been brought by the action of the piston 1, which causes a pivotal movement of this lever, into the position which it occupies in Fig. 2, which position corresponds to the compression of the accelerating spring 17.

The operation of the device is as follows:

The lever 5 being in its normal position, (the spring 17 being expanded) towards the end of the rearward stroke of the piston 1 Fig. 1 the shoulder 11 engages the incline 10 of the arm 8.

Owing to the momentum possessed by the moving parts of the firearm the piston 1 causes the lever 5 to pivot against the action of the accelerating spring 17 which is therefore compressed. It will furthermore be noticed that the force which the piston is called upon to overcome for the purpose of causing this pivoting action increases very rapidly. On the one hand the compression of the spring requires an ever increasing effort and on the other hand the point of abutment 12 of the piston 1 upon the arm 8, owing to the profile of the incline 10 will approach the shaft 6 during this pivoting movement thereby diminishing the lever arm of the force exerted by the piston. The movement of this latter towards the rear, which movement acts to compress the spring 17, Fig. 2 will therefore be very rapidly damped. Under the influence of its recuperating spring 4, this piston will move forwardly again. The commencement of this forward stroke will be accelerated owing to the fact that the spring 17 restitutes the energy which it has stored up as it expands and therefore gives the piston 1 a vigorous impulse through the intermediary of the lever 5. Compression of the spring 17 upon which depends the efficacity of impulse and, consequently, an acceleration of the speed of firing, will be greatly extended owing to the fact that the action of the piston 1 upon the spring 17 will take place abruptly. In this manner it is possible to utilize with a maximum of efficiency the momentum possessed by the moving parts of the automatic firearm. Naturally the ratio of the lengths of the driving arm 8 and the driven arm 9 of the pivoting lever 5, which ratio controls the degree of compression of the spring 17 for the same active stroke of the piston 1, may vary. In the same way the angle which may exist between these two arms is not absolutely fixed. This pivoting lever 5 might moreover be constructed in practice in a number of ways and two other forms of

execution have been shown in Figs. 3 and 4.

In Fig. 3 the arms 8 and 9 of the bell crank lever are arranged at an angle to each other but the driven arm 9 which is then directed towards the rear of the weapon acts directly upon the spring 17 and causes its compression without the intermediary of any other device.

In the case of Fig. 4, showing a substantially straight lever, this particularity also exists but the driving arm 8 and the driven arm 9 are arranged substantially in a prolongation one of the other.

It will be understood that the invention has only been described and shown purely by way of example but in no way limitatively and that various modifications in detail could be made therein without departing from the spirit of the invention.

I claim:

1. In an automatic fire-arm, the combination of a reciprocating piston and a return spring therefor, said piston having a shoulder, a two-armed lever adapted to be engaged by said shoulder towards the end of the rearward stroke of said piston, and means associated with said lever to absorb the energy of said piston on recoil, and to accelerate the return of said piston to the initial position.

2. In an automatic fire-arm, the combination of a reciprocating piston and a return spring therefor, said piston having a shoulder, a two-armed lever having one of its arms located in the path of said shoulder, and a spring connected to the second arm of said lever and adapted to be compressed by the rocking movement of said lever as said piston recoils, and to accelerate the return of said piston to the initial position.

3. In an automatic fire-arm, the combination of a reciprocating piston and a return spring therefor, said piston having a shoulder, a two-armed lever pivoted in the fire-arm, one arm of said lever being adapted to be engaged by said shoulder towards the end of the rearward stroke of said piston, the faces of said lever-arm and shoulder being shaped as to engage by rolling contact, and means for storing up the energy imparted by the piston during the rocking of said lever, to accelerate the return of said piston to the initial position.

4. In an automatic fire-arm, the combination of a reciprocating piston, and a return spring therefor, said piston having a shoulder, a two-armed lever pivoted in the fire-arm, one arm of said lever being adapted to be engaged by said shoulder towards the end of the rearward stroke of the piston, the co-acting faces of said shoulder and lever arm being shaped so that the point of application of the force transmitted by the piston continuously approaches the pivot of said lever, and a spring connected to the second arm of said lever and adapted to be compressed by the rocking of said lever and to accelerate the return of said piston to the initial position.

5. In an automatic fire-arm, the combination of a reciprocating piston, and a return spring therefor, a two-armed lever adapted to be rocked by said piston, and a spring mounted in the trigger-guard and connected to one arm of said lever, so as to be tensioned by the rocking motion of said lever.

6. In an automatic fire-arm, the combination of a reciprocating piston, and a return spring therefor, said piston having a shoulder, a two-armed lever pivoted on the fire-arm, one arm of said lever being adapted to be engaged by said shoulder towards the end of the rearward stroke of the piston, a rod connected to the second arm of said lever and enclosed in the trigger casing, and a spring connected to said rod and adapted to be compressed by the rocking of said lever, and to accelerate the return movement of said piston.

CHARLES SUTTER.