May 9, 1950 D. M. WILLIAMS 2,506,982

CARRIER SPRING FOR MAGAZINE TYPE FIREARMS

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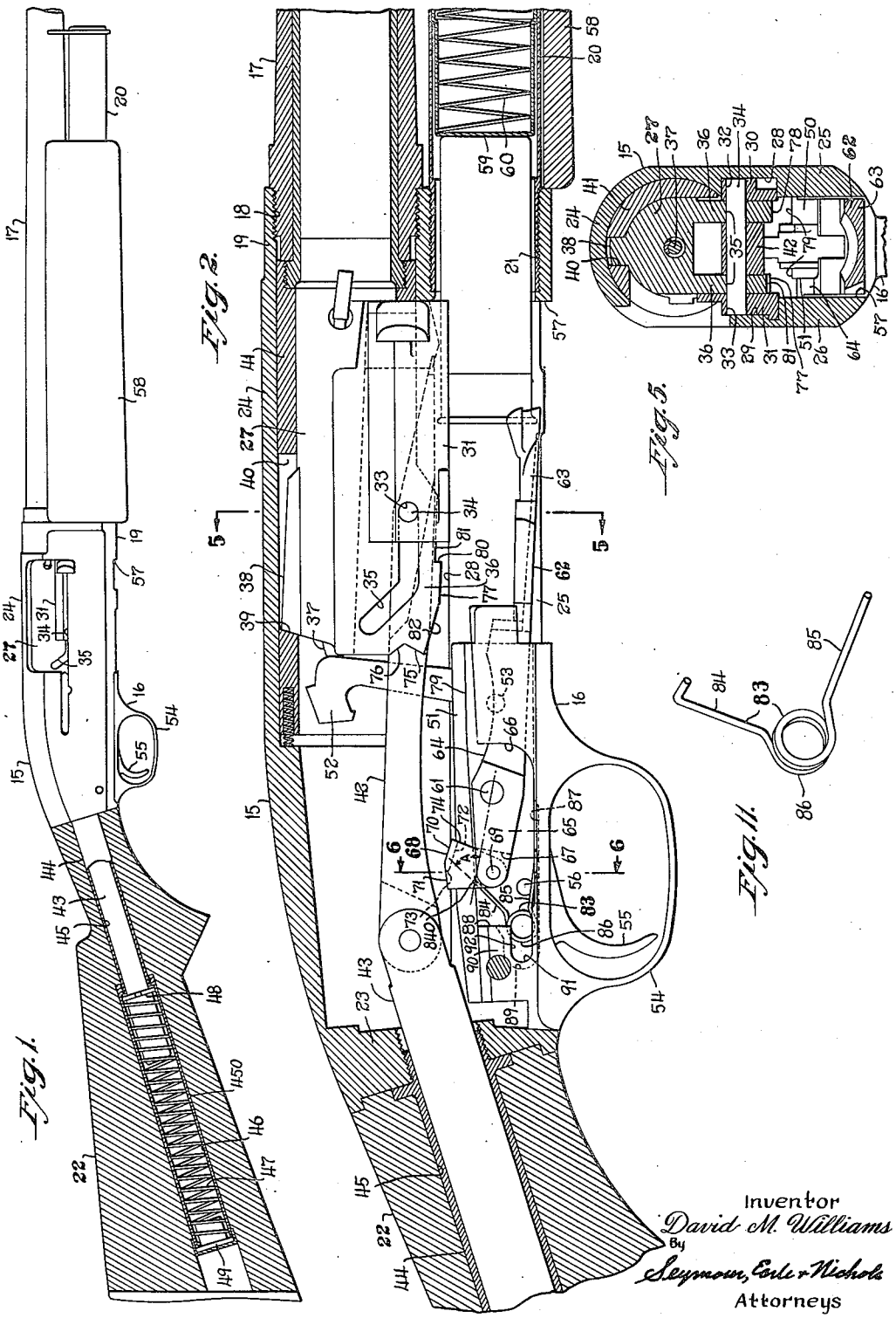


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 11.

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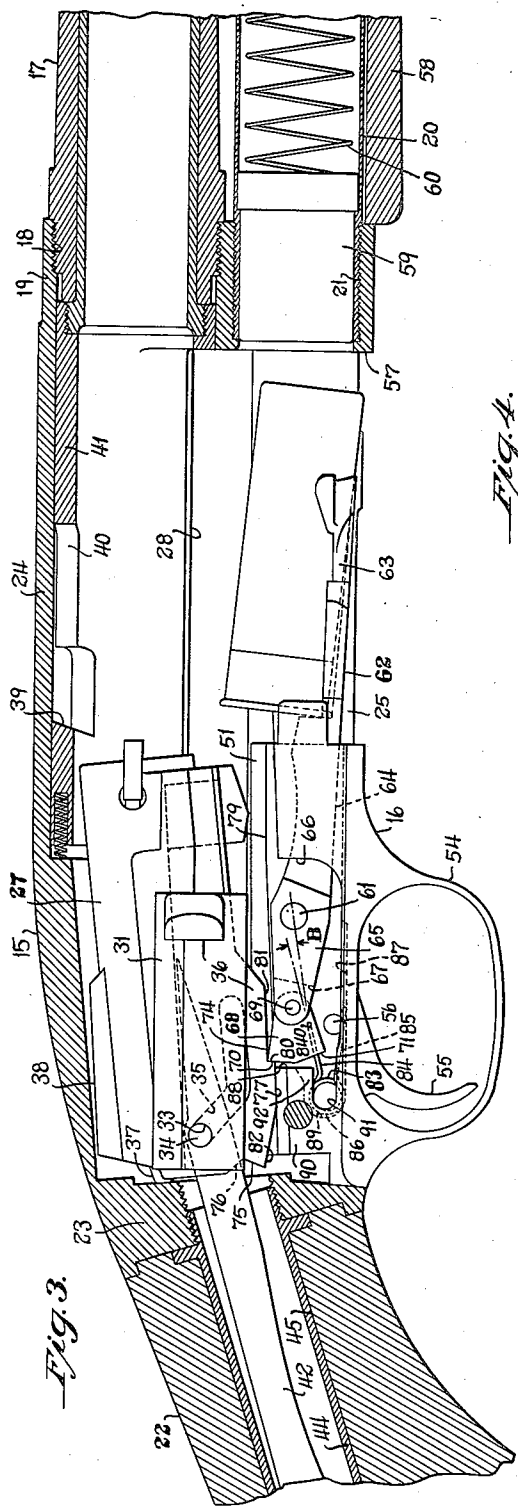


Fig. 3.

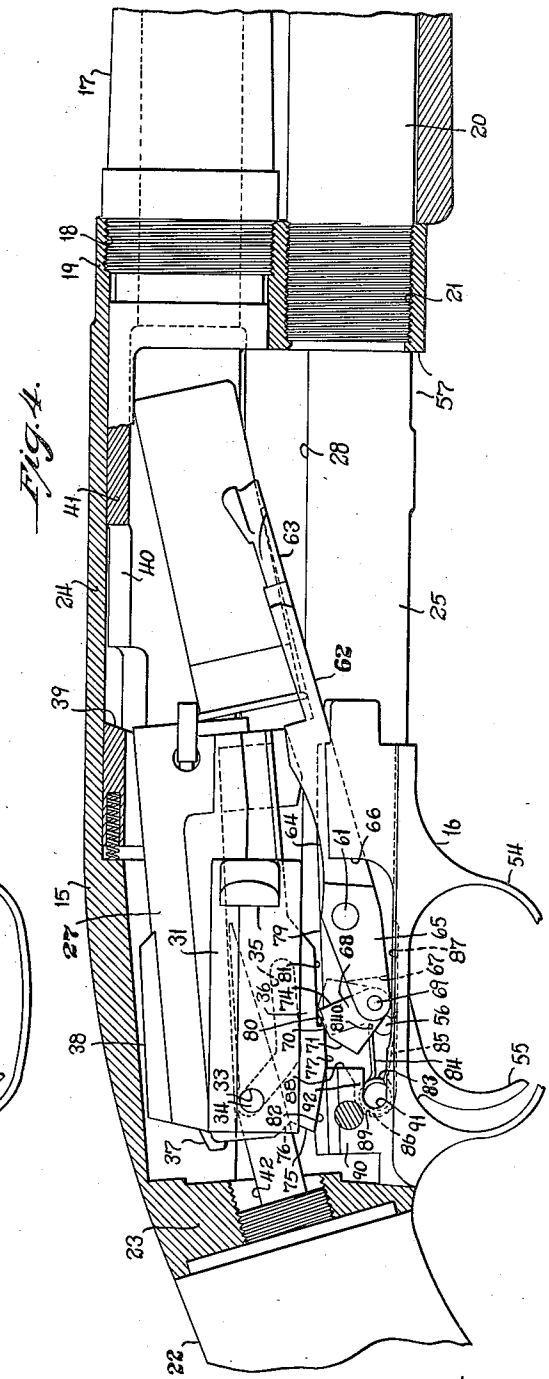


Fig. 4.

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Fig. 6.

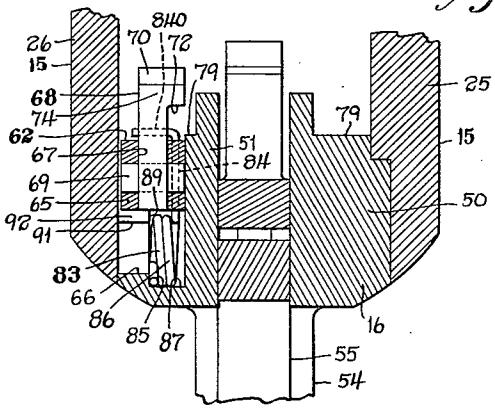


Fig. 9.

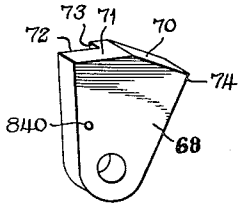


Fig. 7.

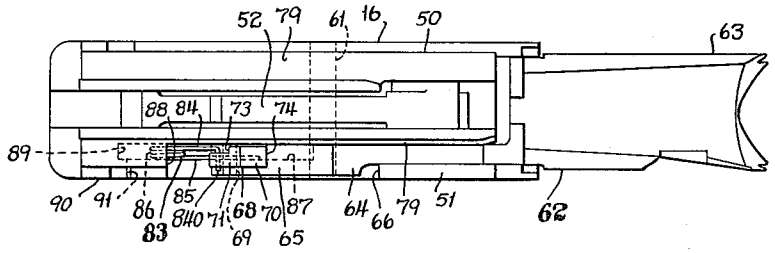


Fig. 8.

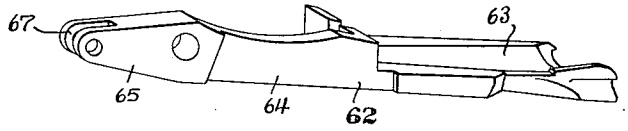
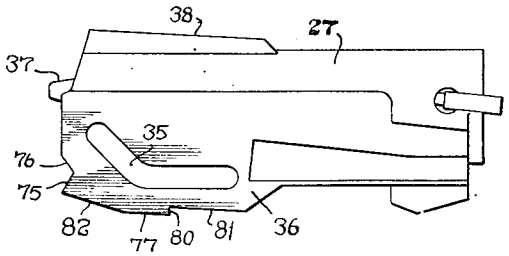


Fig. 10.



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UNITED STATES PATENT OFFICE

2,506,982

CARRIER SPRING FOR MAGAZINE TYPE FIREARMS

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Application March 10, 1947, Serial No. 733,617

6 Claims. (Cl. 42—17)

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The present invention relates in general to firearms and more especially to improvements in self-loading firearms of the type having a tubular magazine and cartridge-transfer means adapted to automatically transfer a cartridge from the tubular magazine to the chamber of the barrel each time the firearm is discharged.

Heretofore, the cartridge-transfer means of self-loading firearms of this class has consisted, in general, of a pivoted cartridge-carrier, the forward end of which is adapted normally to be resiliently held in a depressed position in the receiver substantially opposite the open rear end of the tubular magazine by means of a carrier-spring arranged to engage beneath a rearwardly-extending arm of the carrier. The carrier is adapted to be elevated by the breechblock which, during its forward excursion in the receiver, rides onto a pivoted dog mounted on the rear arm of the carrier so as to depress the latter against the resistance of the carrier-spring and elevate the forward end of the carrier. During the rearward excursion of the breechblock, the latter is adapted to pivot the dog out of its path in any suitable manner so as to avoid elevating the carrier, suitable resilient-means being provided to return the dog into the path of the breechblock before it begins its forward excursion. Thus, the breechblock must have sufficient kinetic energy during its rearward excursion to overcome the resistance of the dog-spring and sufficient residual energy as it starts forward from its rearmost position in the receiver to overcome the resistance of the carrier-spring. Heretofore, the energy required to overcome the resistance offered by these springs has been provided both by utilizing a relatively-heavy breechblock and a relatively-ponderous action-return spring.

An object of the present invention is to provide an improved self-loading firearm.

A further object of the invention is to provide a self-loading firearm with improved cartridge-transfer means characterized by its simplicity of construction, relatively few working parts and superior action.

A still further object of the invention is to provide a self-loading firearm with a single spring which functions both as a carrier-spring and as a spring for the carrier-actuating dog.

A still further object of the invention is to provide a self-loading firearm with a single spring which is adapted to serve both as the spring of the carrier-actuating dog and as the carrier-spring, this single spring being so arranged as to offer relatively little resistance to the breechblock during both its rearward and forward excursions and yet, to exert a relatively-strong force on the carrier so as to depress the latter when the breechblock is moved into its forward position in the receiver.

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With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art and which are not claimed in any separate application.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken side elevation partly in section of a self-loading firearm embodying the improved cartridge-transfer means of this invention;

Fig. 2 is an enlarged broken side elevation in section of the receiver of the firearm including a portion of the buttstock, the barrel and the tubular magazine, the parts of the fire-control mechanism and cartridge-transfer means being in the positions they assume when the breechblock is in its forward breech-closing position and the hammer has been released;

Fig. 3 is an enlarged broken side elevation in section similar to Fig. 2, but showing the breechblock adjacent the end of its rearward excursion in the receiver and a cartridge delivered onto the cartridge-carrier from the magazine;

Fig. 4 is an enlarged broken side elevation in section similar to Figs. 1 and 2, but with the breechblock part way forward in the receiver, in which position the breechblock has engaged and depressed the carrier-actuating dog of the carrier so as to elevate the forward end of the latter;

Fig. 5 is a sectional elevation of the firearm on line 5—5 of Fig. 2;

Fig. 6 is an enlarged fragmentary sectional end elevation of the trigger-plate on line 6—6 of Fig. 2, showing details of the actuating-dog in combination with the carrier-spring;

Fig. 7 is a detached plan view of the trigger-plate showing the carrier and carrier-actuating dog;

Fig. 8 is an enlarged perspective view of the carrier;

Fig. 9 is an enlarged perspective view of the carrier-actuating dog of the carrier;

Fig. 10 is an enlarged side elevation of the breechblock; and

Fig. 11 is an enlarged perspective view of the spring of the carrier and its actuating-dog.

The firearm herein chosen for illustrating the present invention is of the self-loading type wherein the barrel-extension and breechblock

move rearwardly as a unit on discharge of the firearm, the barrel-extension being adapted to move forwardly relative to the breechblock and the latter subsequently moving forwardly automatically to insert a fresh cartridge in the chamber of the barrel.

The self-loading firearm embodying the present invention includes a receiver 15, a trigger-plate 16 mounted in the underside of the receiver adjacent the rear end thereof, a barrel indicated by the reference character 17 and secured at its rear end by a threaded connection or the like in an aperture 18 in the front wall 19 of the receiver, a tubular magazine indicated by the reference character 20 and secured at its rear end in an aperture 21 in the front wall 19 of the receiver, and a buttstock indicated generally at 22 suitably secured to the rear wall 23 of the receiver.

Referring to Figs. 1 through 5, the receiver 15 has a top wall 24 and side walls 25 and 26 depending therefrom to form a substantially-inverted U-shaped chamber for accommodating the breechblock and the fire-control mechanism. The former is indicated generally at 27 and as shown in Fig. 5, is adapted to be supported in the receiver for both longitudinal and pivotal movement therein and to this end, suitable longitudinal guide-grooves 28 and 29 are provided in the inner walls of corresponding sides 25 and 26 of the receiver. The guide-groove 28 is adapted to slidingly support a bar 30 which may combine the function of an action-bar and breechblock-supporting member, whereas the guide-groove 29 is adapted to slidingly support a finger-piece 31 adapted to support the opposite side of the breechblock and to permit manual operation of the breechblock, both the action-bar 30 and finger-piece 31, hereinafter referred to as "guide-members," having transverse apertures 32 and 33 respectively at their rear ends arranged to be aligned axially so as to receive a transverse pivot-pin 34. The latter is adapted to be supported adjacent its opposite ends in substantially rocker-shaped cam-slots 35 formed in the transversely-spaced parallel depending side walls 36 of the breechblock, the action-bar 30 and finger-piece 31 being connected to the outside faces of the corresponding side walls 36 of the breechblock by the respective outer ends of the transverse pivot-pin 34, as shown clearly in Fig. 5. In accordance with the construction, the breechblock is adapted to be supported between the guide-members 30 and 31 for both longitudinal and pivotal movement in the receiver. Other details of the breechblock are considered immaterial to a clear and full disclosure of the present invention, it being sufficient to state that the breechblock is of relatively-light weight, is provided with an axially-mounted spring-loaded firing-pin 37, a spring-loaded ejector (not shown), and a locking-lug 38, the latter being formed integrally on the upper edge of the breechblock and adapted to interlock with a shoulder 39 of a longitudinal aperture 40 formed in the top wall of the barrel-extension 41 when the breechblock is in its forward elevated position in the receiver, so as to lock the breechblock in chamber-closing position. To this end, the aforesaid transverse pivot-pin 34 is adapted to pivotally connect the forward end of an operating-link 42 to the breechblock, the forward end of the link 42 engaging between the spaced parallel side walls 36 of the breechblock, as shown clearly in Fig. 5. The operating-link 42 extends rearwardly from the breechblock and is pivoted at its rear end to

the forward end of an inertia-bar 43 which is supported for longitudinal sliding movement in a sleeve 44 formed integrally or otherwise secured to the rear wall 23 of the receiver. As shown in Fig. 1, the sleeve 44 is arranged to extend rearwardly through a longitudinal aperture 45 in the forward end of the buttstock 22, the rear end of the sleeve being threadedly secured to the forward end of an action-spring guide-tube 450 which extends rearwardly through an axially-aligned counterbore 46 of the aperture 45. The rear extremity of the guide-tube 450 may be closed by a suitable end-closure 49. The action-spring is indicated at 47 and is relatively light, its forward end being adapted to engage against a shoulder 48 at the rear extremity of the inertia-bar, while its opposite end seats against the end-closure 49 of the guide-tube.

Briefly, when the firearm is discharged, the force of its recoil will momentarily displace the breechblock barrel-extension, and operating-link and inertia-bar assembly rearwardly as a unit in the receiver. Subsequently, however, the barrel-extension will be positively stopped from further rearward movement, whereupon the residual energy of the operating-link and inertia-bar assembly will carry the operating-link rearwardly relative to the breechblock, so as to move the transverse pin 34 of the link rearwardly in the rocker-shaped cam-slots 35 of the breechblock and pivot its locking-lug 38 downwardly out of locked engagement with the shoulder 39 of the barrel-extension, whereupon the breechblock will be moved to its rearmost position in the receiver by its own residual energy and the gas pressure in the chamber of the barrel. Following the ejection of the fired shell and the introduction of a fresh cartridge into the receiver, the action-return spring 47 will move the operating-link and breechblock forwardly into breech-closing position, in which position the locking-lug of the breechblock is again elevated into engagement with the shoulder 39 of the barrel-extension by the camming action of the transverse pin 34 in the rocker-shaped cam-slots of the breechblock.

The trigger-plate 16 is secured to the receiver 15 in any suitable manner and constitutes, in general, laterally-spaced parallel side walls 50 and 51 between which the hammer 52 is pivotally secured at at 53. The side walls 50 and 51 of the trigger-plate are adapted to make a tight friction fit between the respective lower edges of the rear portion of the side walls 25 and 26 of the receiver. The trigger-plate also embodies a trigger-guard 54 which encloses the finger-piece 55 of a trigger which is pivotally mounted in the trigger-plate, as at 56, and forms the usual part of the fire-control mechanism of the firearm for locking and releasing the hammer 52. The forward end of the trigger-plate 16 terminates substantially midway of the longitudinal length of the receiver 15 to provide a loading-opening 57 forwardly thereof. Opening rearwardly into the loading-opening 57 is the rear end of the tubular magazine 20 which extends forwardly from the forward wall 19 of the receiver 15 through a longitudinal clearance-groove formed in a forestock 58 which, in turn, extends forwardly beneath the barrel. The tubular magazine 20 houses the usual cartridge-follower 59 which is constantly urged rearwardly in the magazine by the customary helical magazine-spring 60.

Pivotally supported in the forward end of the trigger-plate on a transverse pin 61 and located

in the lower portion of the receiver, is a cartridge-carrier or -elevator 62, the forward end or spoon 63 of which is located normally adjacent the loading-opening 57 and serves to sequentially elevate cartridges which are fed thereto from the open rear end of the tubular magazine 20 into position to be inserted into the chamber of the barrel by the forward return movement of the breech-bolt, as will hereinafter appear. The carrier of the present embodiment has one arm 64 which, as shown in Figs. 7 and 8, is provided with a reach 65 which extends rearwardly of the pivot-pin 61 of the carrier, the reach 65 and that portion of the carrier in which the pivot-pin 61 is mounted being accommodated in a shallow longitudinal recess 66 formed vertically in the side wall 51 of the trigger-plate and intersecting the upper edge thereof.

For the purpose of swinging the cartridge-carrier, and in particular its forward end or spoon 63, in a counterclockwise direction about its pivot 61, as seen in Fig. 2, so as to elevate a cartridge thereon into position for engagement by the forward face of the advancing breech-block, the reach 65 of the cartridge-carrier is provided with a carrier-actuating dog 68 which is mounted in a substantially-vertical slot 67 intersecting the rear end of the reach, the lower end of the carrier-actuating dog, hereinafter termed the "dog" or "actuating-dog" 68, being pivoted in the slot 67 of the reach by a pin 69, as shown in Fig. 2. The actuating-dog is adapted to project upwardly normally, as hereinafter described, above the upper edge of the reach 65 and is provided at its upper extremity with a substantially-gable-shaped surface comprising a forwardly-and-downwardly-inclined cam-surface 70 and a rearwardly-and-downwardly-inclined cam-surface 71. A suitable clearance-recess 72 is provided on the inside wall of the actuating-dog adjacent the back edge thereof, the upper end of which intersects the cam-surface 71, as shown in Fig. 9. The forward edge of the clearance-recess forms a substantially-square shoulder 73 on the inside wall of the actuating-dog, as indicated in Figs. 7 and 9. The cam-surfaces 70 and 71 on the upper end of the actuating-dog are adapted to project upwardly into the path of movement of the breechblock, for the purposes hereinafter described. Moreover, the upper end of the forward edge 74 of the dog presents a substantially-square shoulder which is adapted to be engaged by the leading edge 75 of a V-shaped notch 76 formed in the rear edge of the right-hand side wall 36 of the breechblock as the latter moves rearwardly in the receiver. Referring to Fig. 10, the lower edge of the right-hand side 36 of the breechblock comprises a substantially-flat step 77 which is relatively-short and lies in the horizontal plane of the lower edge 78 of the left-hand side 36 of the breechblock, as indicated in Fig. 5. When the breechblock moves into its rearward position in the receiver, as indicated in Figs. 3 and 4, both the lower edge 78 of the left-hand side of the breechblock and the step 77 of the right-hand side are adapted to be supported on suitable longitudinal tracks 79 formed in the trigger-plate on corresponding sides thereof.

The step 77 of the breechblock terminates at its forward end in the substantially-square shoulder 80 of a longitudinal relief-recess 81 formed at the forward end of the bottom edge of the right-hand side 36 of the breechblock. The rear end of the step 77 intersects the lower end of an upwardly-and-rearwardly-extending substantially-flat cam-surface 82, the upper rear end of which intersects the lower end of the leading edge 75 of the V-shaped notch 76 in the back edge of the breechblock.

When the breechblock is in its forward breech-closing position, both the cartridge-carrier and its actuating-dog are adapted to be held in their respective normal positions in the receiver, that is to say, the forward end or spoon 63 of the carrier is in its depressed position substantially opposite the exit end of the tubular magazine, while the carrier-actuating dog is held in an upright substantially-vertical position with respect to the carrier, as indicated in Fig. 2. To this end, resilient-means is provided comprising a single spring 83 which combines the functions of an actuating-dog spring and a carrier-spring. The spring 83 is a torsion-spring which, as shown in Fig. 11, comprises an upper arm 84 and a lower arm 85, both of which extend forwardly of the coil 86 of the spring. The torsion-spring 83 is adapted to move longitudinally freely in the receiver and to this end suitable mounting-means is provided comprising a longitudinal relief-recess 66 in the side 51 of the trigger-plate, the lower arm 85 and the lower edge of the coil 86 of the spring 83 engaging in a substantially-longitudinal relatively-narrow guide-groove 87 formed in the bottom of the relief-recess 66, as shown in Fig. 6. The rear wall 88 of the relief-recess 66 is formed with a rearwardly-extending aperture 89, see Fig. 7, substantially rectangular in cross section the inner wall of which is co-extensive with the inner face of the relief-recess 66, the outer wall 90 of the aperture 89 having a longitudinal rearwardly-extending slot 91, the forward end of which intersects the forward edge of the wall 88. The width and height of the aperture 89 are only slightly greater than the thickness and diameter respectively of the coil 86 of the spring 83, whereby the latter is enabled to move freely rearwardly into the aperture 89 from its normal forward position in the relief-recess 66 as hereinafter described, the height of the longitudinal slot 91 in the outer wall 90 being less than the diameter of the coil 86 so as to provide a depending flange 92 to retain the coil in an upright position in its guide-groove 87, see Fig. 6, during forward and rearward movement of the spring therein as hereinafter described.

The upper arm 84 of the torsion-spring 83 is adapted to engage in the clearance-space 72 on the inside face of the carrier-actuating dog and is adapted to be pivotally fastened as a 840 to the rear edge of the dog at a point thereon above its pivot 69. The force of the torsion-spring 83, acting through the upper arm 84, is adapted normally both to hold the carrier-actuating dog 68 in its normal upright forward position with respect to the reach 65 of the carrier and, through its connection therewith by the dog, to exert a force on the reach 65 to pivot the latter about its pivot 61 in a clockwise direction, as seen in Fig. 2, thereby to hold the forward end or spoon 63 of the carrier in its normal depressed cartridge-receiving position. This position of the torsion-spring will be hereinafter referred to as its "normal" or "operating" position, whereas, the retracted position of the spring shown in Figs. 3 and 4 will be referred to as its "inoperative" position. It will be observed that when the spring 83 is in its operating position, the vertical force vecttor of its upper arm 84, acting at 840 on the actuating-dog 68, is a function of the angle A which the upper arm 84 of the spring

makes with respect to a line through its connection 840 with the dog and the pivot 61 of the carrier, and is relatively large. Hence, the force moment acting about the pivot 61 of the carrier to pivot the latter clockwise and hence hold its spoon in its normal depressed position, will be relatively large. On the other hand, when the spring 83 is moved to its retracted position in the relief-recess, as shown in Figs. 3 and 4, the vertical force vector of the upper arm 84 of the spring will be reduced in proportion to the difference between the angle A and the angle B which the arm 84 now makes with the line through its connection 840 with the dog and the pivot 61 of the carrier. Hence, the force moment acting about the pivot 61 of the carrier to resist counterclockwise rotation thereof, will be proportionately smaller, that is to say, the carrier-reach may be depressed to raise the spoon 63 with relatively little effort. Moreover, insofar as the pivotal movement of the actuating-dog relative to the carrier is concerned, inasmuch as the spring 83 is free to move rearwardly in its guide-slot, the upper arm 84 of the spring will offer relatively little resistance to the initial rearward pivotal movement of the dog about its pivot 69.

The operation of the device may be described briefly as follows. Assuming the breechblock is in its forward breech-closing position and that the trigger 55 has been pulled to release the hammer 52 which strikes the firing-pin 37 to fire a cartridge in the chamber of the barrel, the force of the gases created by the discharge of the cartridge will move the breechblock 27 and barrel-extension 41 rearwardly in the receiver, in the manner explained above. As the leading edge 75 of the notch 76 in the rear edge of the breechblock engages the forward edge 74 of the carrier-actuating dog 68, the latter will be pivoted rearwardly in a counterclockwise direction relative to the carrier 62. The latter, however, will remain substantially immobile since the direction of the force applied by the breechblock is substantially parallel to the longitudinal axis of the carrier-reach 65. The rearward pivotal movement of the actuating dog initially forces the upper arm 84 of the torsion-spring 83 rearwardly so as to move the spring to its rearmost position in the relief-recess 66 and thereafter depresses the spring-arm 84, as indicated in Figs. 3 and 4. To the latter end, first the cam-surface 82 and then the step 77 of the breechblock engage and ride over the forward edge 74 of the actuating-dog, thereby holding the latter in its rearwardly-depressed position as the breechblock approaches its rearmost position in the receiver. At its rearmost position in the receiver, see Fig. 3, the step 77 of the breechblock is carried beyond the cam-face 79 of the carrier-actuating dog, whereupon the force of the depressed upper arm 84 of the torsion-spring pivots the actuating-dog upwardly into the relief-recess 81, so that the cam-surface 70 of the dog engages or is in substantial engagement with the shoulder 80 of the breechblock. During this interval, a fresh cartridge is adapted to be released, from the tubular magazine by a cartridge-stop or equivalent device (not shown), onto the carrier, and subsequently the breechblock, under the force of the compressed action-spring 47, begins to move forwardly in the receiver. The shoulder 80 of the breechblock thus exerts a force against the cam-surface 70 of the carrier-actuating dog, which force is directed along a line above the

dead-center line of the actuating-dog, as a consequence of which the pivot 69 thereof is forced downwardly, as indicated in Fig. 4. This downward displacement of the pivot 69 at the rear extremity of the reach 65 of the carrier effects the concurrent upward pivotal movement of the forward end 63 of the carrier, whereby the cartridge mounted thereon is elevated upwardly in the receiver to a position such that the forward end of the cartridge is opposite the chamber of the barrel, as indicated in Fig. 4. As the breechblock continues its forward movement, its step 77 rides onto the cam-surface 70 of the dog, the frictional engagement of these two mutually-engaging surfaces sufficing to pivot the dog 68 clockwise about its pivot 69. As the dog pivots forwardly, the torsion-spring 83 is carried forwardly bodily in the relief-recess 66, whereupon the force of its upper arm 84 acts to snap the dog forwardly into its normal forward position with respect to the carrier, in which position the downwardly-and-rearwardly-sloping cam-surface 71 of the dog is moved into engagement with the step 77 of the breechblock so as to hold the carrier-reach depressed as the breechblock continues its forward movement. During the transition of the cam-surface 70 from engagement with the shoulder 80 of the breechblock to a position forwardly thereof, as indicated by the dotted lines in Fig. 4, the force of the torsion-spring 83, acting on the reach 65, may momentarily depress the carrier-spoon slightly. However, substantially immediate engagement of the step 77 with the downwardly-and-rearwardly-sloping cam-surface 71 of the carrier-actuating dog again elevates the forward end of the carrier, the elevation of which may be increased slightly as the step 77 of the breechblock advances into engagement with the forwardly-and-downwardly-sloping cam-surface 70 of the actuating-dog. Thereafter, as the step 77 of the breechblock leaves the cam-surface 70 of the dog, the latter moves up into engagement with the upwardly-and-rearwardly-inclined cam-surface 82 of the breechblock, the slope of which permits the dog to be moved upwardly by the force of the spring-arm 84 acting thereon, to pivot the carrier in a clockwise direction so as to depress the forward end 63 thereof out of the path of the breechblock. The latter has already entered the fresh cartridge into the breech-end of the barrel and now advances the cartridge fully into the chamber. When the breechblock is locked in its foremost chamber-closing position in the receiver, the dog will be again in its normal operating position, as shown in Fig. 2, and the spoon 63 of the carrier will be opposite the rear opening of the tubular magazine in a position to receive the next cartridge therefrom.

From the foregoing description and drawings, it will be clear that in accordance with the present invention, a single spring is provided which acts both as a spring for the carrier-actuating dog-spring and as a carrier-spring to depress the forward end of the latter, the spring being so arranged that the relatively-strong force acting to hold the carrier-spoon in its depressed position does not act through the dog to resist the rearward movement of the breechblock, the rearward bodily displacement of the spring effectively reducing the resistance offered by the spring to the rearward pivotal movement of the dog and the subsequent elevation of the carrier-spoon. It will be understood that the invention is equally applicable to a self-loading firearm of

the type where the barrel-extension and breechblock move rearwardly as a unit in the receiver.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. In a self-loading firearm, the combination with a receiver; a barrel secured to said receiver and a tubular magazine supported beneath said barrel; of a breechblock reciprocably mounted in said receiver; a carrier arranged to transfer cartridges from said magazine to the chamber of said barrel; carrier-supporting means secured to said receiver; a carrier-actuating dog mounted on said carrier, said carrier-actuating dog being arranged to be displaced relative to said carrier by said breechblock during the rearward excursion thereof; and resilient-means, said resilient-means being mounted on said carrier-supporting means for longitudinal displacement relative thereto and engageable with said carrier-actuating dog so as to exert relatively-weak resistance to the displacement of said actuating-dog during the rearward excursion of said breechblock and to exert relatively-strong force on said carrier to hold it in its normal position when said breechblock is in its forward chamber-closing position.

2. In a self-loading firearm, the combination with a receiver; a barrel secured to said receiver and a tubular magazine supported beneath said barrel; of a breechblock reciprocably mounted in said receiver; a pivoted carrier arranged to transfer cartridges from said magazine to the chamber of said barrel; carrier-supporting means secured to said receiver; a carrier-actuating dog mounted on said carrier, said carrier-actuating dog being arranged to be displaced rearwardly with respect to said carrier by said breechblock during the rearward excursion thereof and to be moved forwardly from its rearward position by said breechblock during the forward movement thereof; and an actuating-dog spring connected to said dog, said spring being slidably mounted on said carrier-supporting means to exert relatively-weak resistance to the rearward displacement of said actuating-dog during the rearward excursion of said breechblock and to exert relatively-strong force on said carrier to hold the latter in its normal forward position when said breechblock is in its forward chamber-closing position.

3. In a self-loading firearm, the combination with a receiver having a trigger-plate secured thereto provided with a flanged groove; a barrel secured to said receiver and a tubular magazine supported beneath said barrel; of a breechblock reciprocably mounted in said receiver; a carrier pivotally mounted in said trigger-plate and arranged to transfer cartridges from said magazine to the chamber of said barrel; a carrier-actuating dog movably mounted on said carrier, said carrier-actuating dog being arranged to be displaced rearwardly with respect to said carrier by said breechblock during the rearward excursion thereof and to be moved forwardly from its rearward position by said breechblock during the forward movement thereof; and an actuating-dog spring connected to said dog, said spring being supported in the flanged groove of said trigger-plate for longitudinal displacement

therein so as to exert relatively-weak resistance to the rearward displacement of said actuating-dog during the rearward excursion of said breechblock and to exert relatively-strong force on said carrier to hold the latter in its normal forward position when said breechblock is in its forward chamber-closing position.

4. In a self-loading firearm, the combination with a receiver; a barrel secured to said receiver and a tubular magazine supported beneath said barrel; of a breech-block reciprocably mounted in said receiver; a pivoted carrier arranged to transfer cartridges from said magazine to the chamber of said barrel; a carrier-actuating dog pivotally mounted on said carrier, said carrier-actuating dog being arranged to be pivoted rearwardly with respect to said carrier by said breechblock during the rearward excursion thereof and to be pivoted forwardly from its rearward position by said breechblock during the forward movement thereof; an actuating-dog spring connected to said dog; and means to slidingly support said spring in said receiver for rearward displacement therein by the rearward pivotal movement of said dog, whereby said spring exerts relatively-weak resistance to the rearward pivotal movement of said actuating-dog during the rearward excursion of said breechblock, said spring being arranged to be moved forwardly by the forward pivotal movement of said actuating-dog to urge said actuating-dog into its normal forward position with respect to said carrier and to exert relatively-strong force on said dog to hold said carrier in its normal position when said breechblock is in its forward chamber-closing position.

5. In a self-loading firearm, the combination with a receiver; a barrel secured to said receiver and a tubular magazine supported beneath said barrel; of a breechblock reciprocably mounted in said receiver; a pivoted carrier having a rearwardly-extending reach and a forwardly-extending arm arranged to transfer cartridges from said magazine to the chamber of said barrel; a carrier-actuating dog pivotally mounted on the rearwardly-extending reach of said carrier, said carrier-actuating dog being arranged to be engaged and pivoted rearwardly with respect to said carrier by said breechblock during the rearward excursion thereof and to be pivoted forwardly from its rearward position and simultaneously to be depressed by said breechblock during the forward movement thereof to pivot the rearwardly-extending reach of said carrier downwardly; an actuating-dog spring connected to said dog; and means to slidingly support said actuating-dog spring in said receiver for rearward displacement relative to said carrier by the rearward pivotal movement of said dog, whereby said spring exerts relatively-weak resistance to the rearward pivotal movement of said dog during the rearward excursion of said breechblock, said spring being arranged to be moved forwardly by the forward pivotal movement of said actuating-dog as said breechblock moves forwardly into chamber-closing position simultaneously to urge the actuating-dog forwardly into its normal position with respect to said carrier and to pivot the rearwardly-extending reach of said carrier upwardly so as to depress the forwardly-extending arm of said carrier.

6. In a self-loading firearm, the combination with a receiver; a barrel secured to said receiver and a tubular magazine supported beneah said barrel; of a breechblock reciprocably mounted in

said receiver; a pivoted carrier arranged to transfer cartridges from said magazine to the chamber of said barrel; carrier-supporting means having a relief-recess in one wall thereof; a carrier-actuating dog mounted on said carrier, said carrier-actuating dog having a normal position in said carrier and arranged to be displaced from its normal position relative to said carrier by said breechblock during the rearward excursion thereof so as to engage and hold said breechblock in its open position in said receiver; and a single spring mounted to move longitudinally in the relief-recess of said carrier-supporting means so as to be displaced by the rearward displacement of said actuating-dog thereby to exert relatively-weak resistance to the rearward displacement thereof, said spring being arranged to be re-

turned to its normal forward position in said relief-recess by said actuating-dog as said breechblock moves into its chamber-closing position so as to exert a relatively-strong force on said carrier to hold the latter in its normal depressed position in said receiver.

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