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FIREARM WITH DEVICE FOR MOVING THE MUZZLE DOWNWARDLY

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Fig. 1

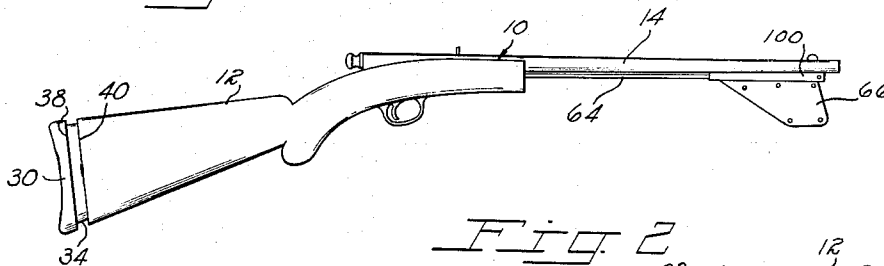


Fig. 2

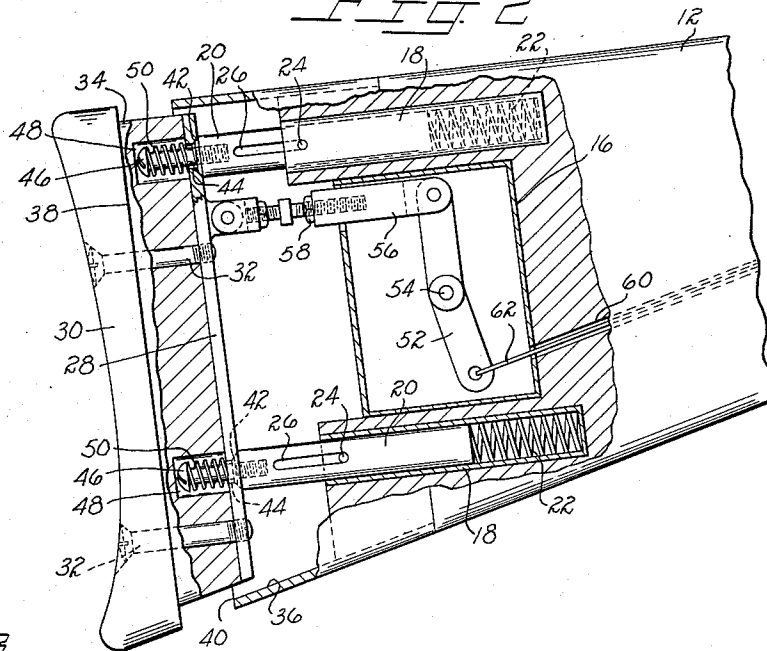


Fig. 3

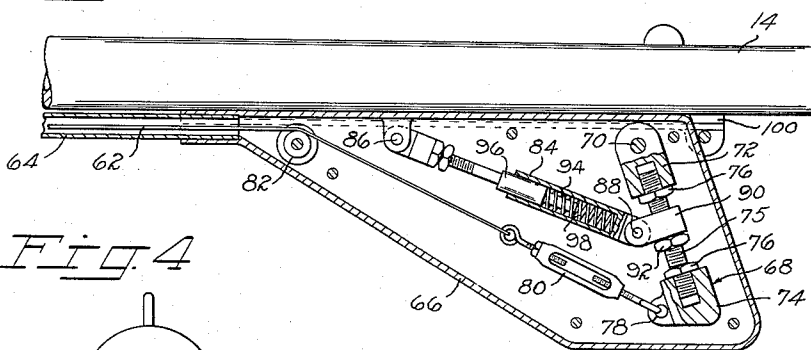
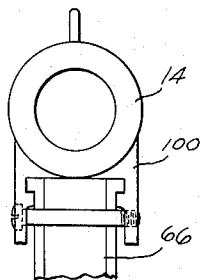


Fig. 4



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FIREARM WITH DEVICE FOR MOVING THE MUZZLE DOWNWARDLY

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7 Claims. (Cl. 42—74)

This invention relates to improvements in a hand operated firearm and, more particularly, to the embodiment within a hand operated firearm of means operable during the recoil of the firearm to counteract the tendency of the muzzle end of the firearm to be deflected upward during the recoil thereof.

This application is a continuation-in-part of pending application Ser. No. 655,500, filed March 19, 1946, for Attachment for Firearms.

In hand operated firearms of both the hand held and shoulder supported types, there is a tendency for the muzzle ends of the firearms to deflect upward during the recoil of the firearms and particularly when said firearms are successively fired rapidly, such as during semi-automatic or full automatic operations. Under such operations, these firearms have a well-known tendency to "climb" and it is difficult to hold the firearm on the target. Thus, it is difficult to fire such firearms accurately while they are operated under the stated conditions.

A number of devices have been previously developed for purposes of attempting to overcome the tendency of firearms to climb as aforementioned. A number of these have been based upon the principle of applying a weight to the muzzle end of the barrel in an effort to reduce the tendency of the firearm to climb. However, it has been found that, in general, the application of fixed weights to such firearms have not produced desired results.

It is an object of the present invention to embody within a hand operated firearm means which are movable incident to the recoil of the firearm, such movement having a tendency to rotate the firearm about an axis transverse to the barrel and in a direction which will lower the muzzle end of the firearm so as to counteract the normal tendency of said muzzle end to be deflected upward.

It is another object of the invention to actuate said movable means by mechanism movable relative to the firearm in a recoil direction and connect said movable means with other mechanism at the muzzle end of the firearm for purposes of moving said other mechanism backward and downward.

It is a still further object of the invention to embody within the movable means at the muzzle end of the firearm additional mechanism which is compressible and resists rearward movement of said movable means to establish a rotative force tending to move the muzzle end of the firearm downward.

Details of these objects and of the invention, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawing comprising a part thereof.

In the drawing:

Fig. 1 is a side elevation of a hand operated firearm embodying the principles of the present invention.

Fig. 2 is an enlarged fragmentary portion of an exemplary stock of a firearm embodying part of the present invention, said illustration being partly in section to illustrate details of the invention.

Fig. 3 is a fragmentary portion of a muzzle end of the

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firearm embodying the principles of the present invention, said figure being on the same scale as Fig. 2 and being partly in section to illustrate details of the invention.

Fig. 4 is a further enlarged fragmentary front end view of the muzzle end of the firearm.

Referring to the drawing, a rifle 10 has been selected as an exemplary illustration of a hand operated firearm in which the principles of the present invention have been embodied.

Said rifle comprises a stock 12 which is secured to a barrel 14. The rearward end of the stock is provided with a cavity 16 which receives part of the mechanism comprising the invention as will be presently described. The stock is also provided with a pair of cylindrical guide sleeves 18 which slidably receive plungers 20. The plungers are normally biased rearward by suitable springs 22, such rearward movement of the plungers being limited by stop pins 24 which extend through longitudinal slots 26 provided in the plungers.

Supported on the rearward ends of said plungers 20 is a plate 28 to which a member 30 is secured by screws 32, the member 30 comprising a butt plate. The member 30 has a reduced portion 34 which is complementary to the inner surface 36 of the rearmost portion of cavity 16. The reduced portion 34 is shaped so as to fit the inner surface 36 when the member 30 is moved forward relative to the stock 12 until the shoulder 38 of the member 30 abuts the rear end 40 of the stock 12. Member 30 is normally maintained in its rearmost position illustrated in Figs. 1 and 2 by the springs 22.

When the firearm is held so that the member 30 is against the shoulder of the shooter, the stock will move relatively toward the member 30 during the recoil of the gun following the firing thereof. The purpose of the springs 22 is to keep each end of the member 30 uniform with the stock 12, thereby avoiding any tendency for the member 30 to assume an angular or cocked position when the gun is not being fired.

In order that there will be no binding between plungers 20 and the sleeves 18 during such functioning of the stock and member 30, as well as otherwise facilitate the functioning thereof, the plate 28 and member 30 are secured to the rear ends of plungers 20 by means which will permit an appreciable amount of floating movement between the member 30 and the stock 12. Such connecting means comprise chamfered sockets 42 which receive the rear ends of the plungers 20, said rear ends preferably being slightly rounded. The plate 28 is provided with apertures 44 which are slightly larger in diameter than screws 46 which pass therethrough and extend rearward into cavities 48 provided therefor in member 30.

Mounted between the head of each screw and the plate 28 is a spring 50 which resiliently holds the plate 28 against the rear ends of plungers 20 but nevertheless permits a certain amount of swivel action between the plates and plungers in the event the upper or lower end of the member 30 is moved inward more than the other during the recoil of the firearm. It will thus be seen that the connection between the member 30 and the plungers 20 is flexible and results in an easier cushioning of the stock 12 during recoil than if connection between the member 30 and the plungers 20 was rigid. A lever 52 is pivotally supported intermediately of its ends on a pin 54 fixed relative to the butt 12 within the cavity 16. The upper end of said lever is connected by an adjustable link 56 to plate 28 and member 30 which is fixed thereto. The ends of link 56 are pivotally connected to the plate 28 and lever 52, as shown in Fig. 2, and adjustment of the link is maintained by a suitable lock nut 58.

The stock 12 is provided with a longitudinal passage 60 which communicates at its rear ends with cavity 16 and receives a flexible cable 62, the rear end of which is con-

nected to the lower end of lever 52. Said passage extends through the length of the stock and communicates with a conduit 64 extending preferably below and parallel to the barrel 14.

A casing 66 is secured to the forward or muzzle end portion of the firearm as shown in Figs. 1 and 3. The rearward end of casing 66 communicates with the forward end of conduit 64. Said casing contains an adjustable link 68 which depends from the muzzle end of the firearm and is pivotally secured by a pin 70 fixed relative to the casing 66 and barrel 14. The link preferably normally extends downward and forward relative to the pin 70. In the preferred embodiment, the link 68 comprises a pair of spaced members 72 and 74 which have axially aligned threaded apertures receiving a threaded rod 75. Lock nuts 76 maintain the members 72 and 74 in any desired spaced position which determines the length of the link 68. The lower member 74 is provided with an eye 78 which receives one end of a turnbuckle 80 that is connected to the forward end of a cable 62. The casing 66 also rotatably supports a pulley 82 over which the cable 62 passes so that the forward end thereof extends downward as well as forward.

A longitudinally compressible member 84 is pivotally connected at one end to a pin 86 fixed relative to the casing 66 immediately below the under surface of barrel 14 and extending forward and downward from said pin. The other end of member 84 is connected by pin 88 to a threaded sleeve 90 adjustably mounted on threaded rod 75 of link 68 intermediate the ends thereof. A lock nut 92 serves to maintain the sleeve 90 in any desired adjusted position. The compressible member 84 comprises a sleeve 94 which receives a plunger 96 and a compression spring 98. Part of the plunger 96 extends within the spring 98 to assist in centering the spring within the sleeve 94. The construction of the compressible member 84 is such that it will oppose rearward movement of the link 68. The casing 66 may be secured to the under side of the muzzle end of the barrel 14 by a suitable channel member 100 fixed preferably to the under surface of the barrel 14 as shown in Figs. 1, 3 and 4. It is to be understood however that such attachment of the casing 100 directly to the barrel is merely by way of example since the casing 100, and especially the link 68 and member 84, may be fixed to any convenient fixed part of the forward portion of the firearm.

The operation of the firearm during recoil is as follows: Immediately following the firing of the firearm, the butt plate member 30 is substantially stationarily fixed against the shoulder of the shooter. The recoil causes the stock 12 to move backward in recoil direction relative to the member 30 or, conversely, the member 30 moves forward relative to the stock 12 during recoil. Relative movement between the member 30 and stock 12 causes the lower end of lever 52 to move rearward relative to the firearm, such movement also being in recoil direction. Said movement of the lower end of the lever moves the cable 62 rearward and the lower end of link 68 at the muzzle end of the firearm is also moved rearward and downward by said cable. All of this movement is very sudden and takes place substantially with a jerk. Such rearward movement of the link 68 is quite strongly opposed by the compressible member 84. All of this function results in the muzzle end of the firearm tending to move downward to resist the normal tendency of the muzzle end of the firearm to deflect upward during the recoil thereof.

The exact reason for the present invention functioning in this manner is not known, but extensive tests have shown that the invention functions in this manner, with the result that even when the firearm is fired under semi-automatic or full automatic conditions, the firearm can be held closely on the target. If the various adjustable members of the invention have been suitably adjusted and coordinated so that the various counteracting forces set up in the firearm and mechanism of the invention suffi-

ciently compensate each other during recoil, the distance the muzzle end is deflected upward is balanced or counteracted by an ensuing downward pull which returns the muzzle end to its unfired position.

It has been found that the opposing force exerted by spring 98 is apparently critical and adjustments have to be made in the length of the compressible member 84 until the force exerted thereby opposes the rearward jerk imposed upon the lower end of link 68, by the recoil of the firearm, to such an extent that there is apparently a tendency on the part of the opposing forces acting upon link 68 to rotate at least the muzzle end of the firearm about an axis transverse to the firearm and in a direction which will lower the muzzle end of the firearm and thus oppose the upward deflection caused normally by the recoil of the firearm. Just where this axis is located is not known. It could be coincident with the pin 70. However, it also could be somewhere along threaded rod 75 and between lower member 74 and sleeve 90. The axis also could be somewhere between pins 70 and 86.

The apparent rotative force produced by the invention may also even tend to rotate the entire firearm about such axis referred to but, since the end of the stock is held relatively stationary by the shoulder of the shooter, the butt end of the firearm cannot move any appreciable distance upward and thus the muzzle end of the firearm is the only portion that can freely move. The muzzle end therefore moves downward. It is admitted that this theory is conjectural but the same is submitted in an attempt to explain the known fact that the invention can be adjusted and regulated so as to reduce or entirely counteract the normal tendency of the muzzle end of a hand operated firearm to deflect upward or climb during recoil, especially when successively fired rapidly.

As stated above, it is believed that the force exerted by the spring 98 is critical. Also, the spring 98 serves as a cushion for the stock 12 during recoil inasmuch as a direct connection exists between the spring 98 and the member 30 via the cable 62. In addition to this it is also believed that the length of the link 68 is critical and the normal angular position thereof relative to the muzzle end of the firearm is also believed to be critical. In view of this, the details of the invention permit not only adjustments in the length and force of the compressible member 84 but the length of the cable 62 may also be adjusted by manipulating the turnbuckle 80 so that the length and angular position of the link 68 may also be varied by the means described above. Suitable adjustments may be made in said adjustable members and means, especially following the initial installation of the invention on any particular firearm, so that adequate reactive force can be established in the compressible member 84 and the length and angular position of the link 68 may be adjusted so as to be adequate to produce at the muzzle end of the firearm, at the time of firing and recoil, force which will tend to move said muzzle end downward in opposition to the normal tendency on the part of the muzzle end to deflect upward due to the recoil of the firearm. One side of the casing 66 is preferably made readily removable to permit access to the various members for adjustment when desired.

A shoulder arm has been selected in the present drawings as one exemplary type of firearm to which the present invention might be applied. It is to be understood, however, that the invention may, with equal facility be applied to other types of hand operated firearms. For example the invention can readily be applied to hand held arms, especially of the automatic pistol types by designing the stock or handle thereof so that a plate or member is disposed adjacent the rear of the stock and is movable relative to the stock during recoil thereof. Such relatively movable members will serve to operate the link 68 which may be mounted adjacent the forward end of the pistol in a manner similar to that illustrated in the present drawings relative to a shoulder

type firearm. Further, the invention is also applicable to so-called gas operated firearms which include, for example, a slide that moves backward during recoil of the firearm. Under these circumstances, while not shown in the present drawings, said slide can be interconnected by a cable 62 or rigid members to the lower end of link 68 mounted adjacent the muzzle end of the firearm and thus eliminate the need for a force shifting means such as lever 52 illustrated in the present drawings.

Thus, while the present invention has been illustrated as applicable to one embodiment of hand operated firearm, it is evident, as described above, that the invention may be applied with equal advantage to other types of hand operated firearms, and therefore, the present invention is not to be restricted to the illustration made and described herein since the scope of the invention is to be determined only from the following claims.

I claim as my invention:

1. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a shoulder piece on the stock movable relative to said firearm incident to the recoil thereof in recoil direction, a depending link pivotally connected to the muzzle portion of the firearm, compressible means engaging said link so as to resist rearward movement thereof, means connecting the lower end of said link and a shoulder piece to transmit forces in a rearward direction to said end of said link during recoil of the firearm and such force opposing the force exerted by the compressible means, and means for adjusting the effective length of the last-named means.

2. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a shoulder piece on the stock movable relative to said firearm incident to the recoil thereof in recoil direction, a depending link pivotally connected to the muzzle portion of the firearm, compressible means engaging said link at a point intermediate the ends thereof so as to resist rearward movement thereof, means to vary the point of engagement between the compressible means and the link means connecting the lower end of said link and movable means to transmit force in a rearward direction to said end of said link during recoil of the firearm and such force opposing the force exerted by the compressible means, and means for adjusting the effective length of the last-named means.

3. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a shoulder piece movable relative to said firearm incident to the recoil thereof in recoil direction, a link pivotally connected at one end to the muzzle portion of the firearm and extending downward and slightly forward from the pivot thereof, compressible means engaging said link so as to resist rearward movement thereof, means adjustable longitudinally of the link connecting the compressible means to the link, and means connecting the lower end of said link and shoulder piece to transmit force in a rearward direction to said end of said link during recoil of the firearm and such force opposing the force exerted by the compressible means.

4. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a member at the rear of the stock movable forward relative thereto

during recoil of the firearm, a link pivoted at one end to the muzzle end of the firearm and depending therefrom, compressible means engaging said link intermediate the ends thereof and resisting rearward movement of said link, a lever pivoted intermediate its ends relative to said stock and connected at one end to said member, and means connecting the other end of said lever and the lower end of said link, whereby forward movement of said member incident to recoil of the firearm imparts rearward movement to the lower end of said link in opposition to the force of said compressible means.

5. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a member at the rear of the stock movable forward relative thereto during recoil of the firearm, means normally biasing said member rearward relative to said stock, a link pivoted at one end to the muzzle end of the firearm and depending therefrom, compressible means engaging said link intermediate the ends thereof and resisting rearward movement of said link, a lever pivoted intermediate its ends relative to said stock and connected at one end to said member, and means connecting the other end of said lever and the lower end of said link, whereby forward movement of said member incident to recoil of the firearm imparts rearward movement to the lower end of said link in opposition to the force of said compressible means.

6. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a member at the rear of the stock movable forward relative thereto during recoil of the firearm, a link pivoted at one end to the muzzle end of the firearm and depending therefrom, compressible means engaging said link intermediate the ends thereof and resisting rearward movement of said link, a lever pivoted intermediate its ends relative to said stock and connected at one end to said member, and a flexible cable connecting the other end of said lever and the lower end of said link, whereby forward movement of said member incident to recoil of the firearm imparts rearward movement to the lower end of said link in opposition to the force of said compressible means.

7. In combination with a hand operated firearm including a barrel and a stock connected thereto, compensating means for moving the muzzle end of the firearm downwardly from an upwardly deflected position caused by the firing of said firearm comprising a member at the rear of the stock movable forward relative thereto during recoil of the firearm, a link pivoted at one end to the muzzle end of the firearm and depending therefrom, telescoping compressible means pivotally connected at one end to the muzzle end portion of the firearm and at its other end engaging said link intermediate the ends thereof and resisting rearward movement of said link, a lever pivoted intermediate its ends relative to said stock and connected at one end to said member, and means connecting the other end of said lever and the lower end of said link, whereby forward movement of said member incident to recoil of the firearm imparts rearward movement to the lower end of said link in opposition to the force of said compressible means.

References Cited in the file of this patent

UNITED STATES PATENTS

480,259	Grant	Aug. 9, 1892
480,587	Jones	Aug. 9, 1892
1,355,252	Olson	Oct. 12, 1920
1,437,796	Fisher	Dec. 5, 1922
2,140,945	Swartz	Dec. 20, 1938