June 19, 1962 R. O. HOGE 3,039,222

GUN STOCK WITH A COMPRESSIBLE FLUID RECOIL ABSORBER

Filed June 4, 1959

Fig. 1

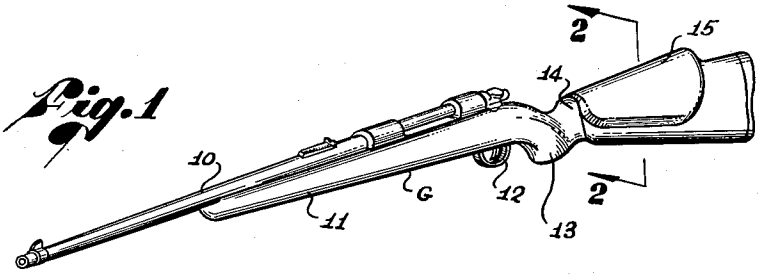



Fig. 2

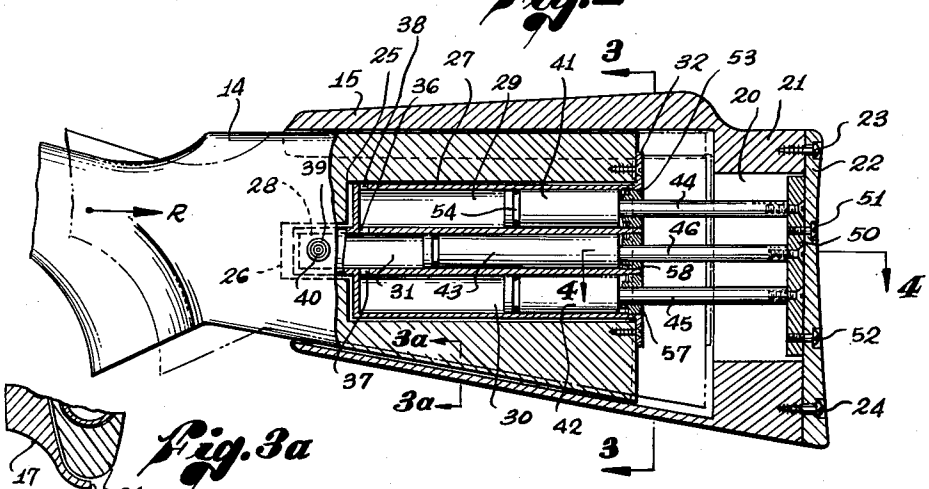



Fig. 3a




Fig. 3

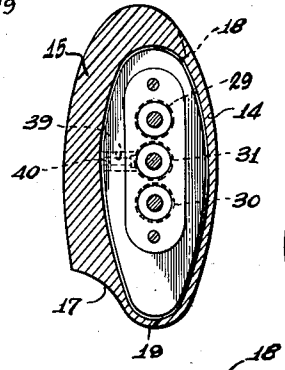



Fig. 4

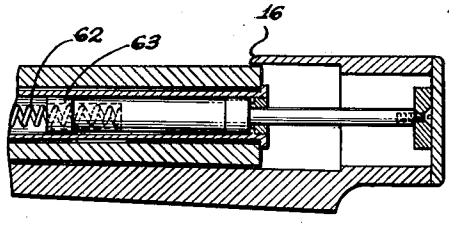
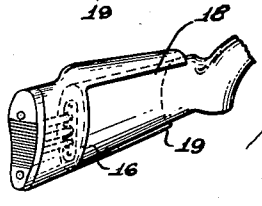



Fig. 5




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# GUN STOCK WITH A COMPRESSIBLE FLUID RECOIL ABSORBER

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5 Claims. (Cl. 42—74)

This invention relates to guns, and more particularly to a recoil-absorbing mechanism for hand-held guns such as shotguns and rifles.

Prior efforts to absorb the recoil attendant upon the use of heavy loads in shotguns and rifles have been directed in some cases to recoil pads of different types that are attached to the buttplate. Other efforts have resulted in oversize, clumsy stock structures that have prevented normal and natural handling, and firing of the gun.

The present shape of a gun stock has been evolved over a period of years, and while it may have its deficiencies, it is accepted and used all over the world. Any recoil-absorbing means should fit within the present stock without substantial modification of the latter if the "shock absorber" is to find wide use and acceptance.

The improved steels now used in modern lightweight guns permit the use of heavy powder charges, with the resulting increased ranges and performance, but with added recoil shock or kick. As a result, the pleasure of practice or actual hunting with modern lightweight, finely balanced guns is lessened by the continuous shoulder-hammering caused by the sharp recoil from heavily loaded cartridges.

Guns are personal to the user and are either specially constructed or at least carefully chosen to the individual physical requirements. It is therefore desirable in recoil devices that there be no material change of gun structure, stock size, balance, and weight.

This invention overcomes the disadvantages of earlier devices by largely absorbing the shock of recoil, accomplishing this result by a mechanism within a standard-size stock, and thus not interfering in any way with the normal handling and performance of the gun.

It is also possible to overcome other defects in earlier devices by receiving and absorbing the shock of recoil against the buttplate in an evenly distributed manner. The further advantage of permitting recoil adjustment to compensate for varying powder loads further increases the pleasure of using such a modern gun.

It is a primary object of the invention to provide an improved recoil cushioning mechanism within a gun stock.

Another object of the invention is to provide a recoil device within the normal confines of the stock and cheek plate of modern guns without increasing the over-all dimensions thereof.

Still another object of the invention is to provide a compressed-air recoil-absorbing mechanism in a gun stock, cheek protector, and buttplate without changing any of the normal gun characteristics of physical conformation, balance, handling, and firing.

Yet another object of the invention is to provide a readily operable mechanism for varying the degree of recoil absorption within the gun stock to compensate for varying cartridge loads.

A further object of the invention is to provide a substantially vertically aligned arrangement of horizontally disposed recoil-absorbing cylinders and pistons between a buttplate and shortened gun stock, the cheek protector providing a cover simulating in all respects the natural stock size, shape, and balance.

These and other objects and advantages of the invention will become apparent from the following detailed description of the preferred form thereof and from an inspection of the accompanying drawings in which:



FIGURE 1 is a perspective view of a modern gun and recoil-absorbing device;

FIGURE 2 is a longitudinal section of the recoil absorbing device taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a cross-sectional view taken on the line 3—3 of FIGURE 2;

FIGURE 3*a* is a cross-sectional view taken on the line 3*a*—3*a* of FIGURE 2;

FIGURE 4 is a sectional view taken on the line 4—4 of FIGURE 2, but including an alternate shock-absorbing means; and

FIGURE 5 is a rear perspective view of the cheek protector and stock.

Referring to the drawings, a conventional bolt-action rifle G is disclosed in FIGURE 1. Any type of sporting or military rifle or shotgun might well be shown, because this invention is particularly adapted for use on any manually portable gun fired from a shoulder position.

The rifle or gun G may include a sighted gun barrel 10 conventionally mounted on a barrel-support and forearm grip 11, and a trigger mechanism 12 and a pistol grip 13, which are standard in all respects. A short stock 14 extends rearwardly from the pistol grip 13 in the usual manner. The stock 14 is conventionally shaped, although smaller in over-all dimension and shorter in length.

A cheek protector 15 is solid and conforms to the normal shape on its cheek-engaging side, but is almost entirely cut away on the opposite side. A rear vertical wall 16, seen in FIGURES 4 and 5, fits over the rear edge of the short stock 14 for telescopic movement with respect to the stock.

The cheek protector 15 is inwardly fashioned at 17 (in FIGURE 3) to engage and partially telescope the short stock 14 with a slightly overlapping upper longitudinal edge 18 and a lower edge 19, shown clearly in FIGURE 5. The various drawing disclosures clearly indicate how the stock 14 and the cheek plate 15 slide in a telescoping manner, this arrangement permitting an almost exact simulation of a normal-sized gun stock.

The cheek protector 15 is recessed at 20 within its heavier butt end 21 to receive recoil-absorbing elements to be described later. A standard buttplate 22 is screw-connected at 23 and 24, respectively, to the cheek protector 15.

The short stock 14 has an inner socket 25 formed therein and also has an extended smaller inner-central recess at 26. Mounted in the socket 25 and the central recess 26 are a metal plug 27 and an extension 28 thereof, respectively. The metal plug 27 is bored to provide upper and lower compressed-air cylinders 29 and 30, and an intermediate cylinder 31 that projects within the extension 28 while flanges 32 hold metal plug 27 to the outer end of short stock 14. The air cylinders 29, 30, and 31 are interconnected at 36 and 37, and a closed tap 38 indicates the manner of drilling the connections 36 and 37 between the cylinders.

In FIGURES 2 and 3, a lateral opening 39 is shown in the short stock 14 communicating with the extended cylinder 31 in the recess 28. A conventional air valve 40 is disposed in the opening and appropriately connected to the compressed-air cylinder 31. The cheek protector 15 normally covers the valve opening 39 and valve 40, but as herinafter described, the cheek protector may be removed to permit access to the valve.

Two short pistons 41 and 42 and an intermediate longer piston 43 are carried in air-compression cylinders 29, 30, and 31, respectively. Piston rods 44, 45, and 46 are connected to the pistons 41, 42, and 43, respectively, and the outer ends of the piston rods are connected to a piston-rod plate 50 housed in the recess 20 of the cheek protector 15. The piston-rod plate 50 is screw-connected

at 51 and 52 to the buttplate 22. The outer end of each of the cylinders 29, 30, and 31 is fitted with a piston rod bushing 53 which helps to keep the various members in alignment. Each of the pistons 41, 42, and 43 has a conventional sealing ring 54 to prevent the leakage of air past the piston, so that good compression may be obtained.

In use, a predetermined air pressure is created in the cylinders 29, 30, and 31 by the insertion or withdrawal of air through the valve 40. The pressure in all three cylinders is equalized by means of the connections 36 and 37, and since the three pistons have substantially the same area, the force exerted on each of the piston rods 44, 45, and 46 is substantially the same. Thus, when the gun is fired and the recoil occurs, the stock 14 is urged back, telescoping into the cheek protector 15. The telescoping action moves the cylinders 29, 30, and 31 with respect to the pistons 41, 42, and 43, respectively, further compressing the air within the cylinders. It will be appreciated that the pistons 41, 42, and 43 are fixed with respect to the cheek protector 15, which carries the buttplate 22 that bears against the user's shoulder. The impulse of the recoil is thus resiliently cushioned by the pneumatic cylinder and piston means disclosed, and the otherwise severe blow against the shoulder is softened. Furthermore, because of the equal size of the pistons, there is no action tending to turn the buttplate 22 or forcing one end of the plate into the shouder.

The amount of air within the cylinders 29, 30, and 31 may easily be adjusted to compensate for different powder loading. By removing the dual screws 51 and 52 connecting the buttplate 22 and the piston-rod plate 50, the cheek protector 15 may be withdrawn slightly beyond its rearward operating position to permit its release from the telescoping engagement with the stock 14. The cheek protector 15 may then be rotated for complete release from short stock 14. In FIGURE 5 it will be seen that the lower edge 19 of protector 15 is moved outwardly and upwardly. With protector 15 removed, compressed air connection of any kind may be made to the valve 40. The air pressure necessary to compensate for the particular cartridge load is produced in the interconnected air cylinders 29, 30, and 31 by pumping additional air into the cylinders, or allowing air already there to escape. In either case the pistons 41, 42, and 43 are extended to the limit of their outward travel or maintained in this position. The cheek protector 15 is then replaced in normal, slightly telescoping position on short stock 14, and buttplate 22 is again connected by dual screws 51 and 52 to the piston-rod plate 50.

The short stock 14 and the buttplated cheek protector 15 are now held in pneumatically sustained relationship, and the gun and stock portion thereof may be handled normally in all positions of use, including shoulder position, ready for firing.

In FIGURE 4 of the drawings, a modification of the recoil-absorbing mechanism is shown. In this instance coil springs 62, only one of which is shown, are disposed in the plural cylinders and supported in sustaining recesses 63 in plural pistons 41, 42, and 43. The coil springs 62 are compressed to hold the short stock 14 and buttplated cheek protector 15 in recoil-absorbing position at all times.

In both forms, cheek protection is provided against stock recoil, and the recoiling stock itself is so completely contained that with the user's left hand on the barrel grip and the right hand on the trigger grip there is no possibility of any physical connection with the recoiling elements therein.

While the form of the invention shown and described is fully capable of achieving the objects and providing the advantages hereinbefore stated, it will be realized that variations are possible without departure from the spirit of the invention. For this reason it is not intended



to limit the invention to the form shown and described, but rather to the scope of the appended claims.

I claim:

1. A gun of the class described and comprising: a short stock having a rearwardly facing socket opening through the rear edge thereof, said short stock having a generally horizontal upper edge with a lower edge which extends downwardly and rearwardly in a generally straight line; a plurality of parallel cylinders formed as a rigid integral unit, said unit being received within said socket and being mounted on said short stock; a plurality of pistons, each being mounted in close sliding fit within a corresponding one of said cylinders; resilient means within said cylinders urging said pistons toward a rearward position in said cylinders; a butt plate releasably secured to said pistons; a cheek protector rigidly affixed to said butt plate, said cheek protector being telescoped over said short stock and being internally shaped complementarily to said upper and lower edges of said short stock, said cheek protector having a cheek receiving surface on one side thereof, the opposite side of said protector being cut away so as to have a lower edge aligned along approximately the center of the lower edge of said short stock, an upper edge extending generally parallel to, but spaced from the upper edge of said short stock, and a forwardly facing edge extending generally parallel to the rear edge of said short stock, said forwardly facing edge overlapping the rear end of the stock a small distance when the pistons are in the rearward position.

2. A gun of the class described which includes: a short stock member affixed to the gun barrel; a butt plate member mounted on said stock member for relative movement forwardly and rearwardly of the gun; a plurality of cylinders mounted on one of said members with their longitudinal axes mutually parallel and extending generally forwardly and rearwardly of the gun; means forming fluid passageways interconnecting said cylinders; a plurality of pistons slidably disposed, one each, in said cylinders, and secured to the other of said members; compressible fluid under a predetermined pressure greater than atmospheric pressure in said cylinders normally urging said pistons in the direction whereby said buttplate member is moved rearwardly of the gun, and yieldably resisting movement of said pistons in the opposite direction; and means limiting the rearward movement of said buttplate member.

3. A gun of the class described which includes: a stock member affixed to the gun barrel; a buttplate member mounted on said stock member for relative movement forwardly and rearwardly of the gun along a direction line generally parallel to the longitudinal axis of the barrel; a plurality of spaced-apart cylinders mounted on one of said members with their longitudinal axes arranged parallel to said direction line; means forming fluid passageways interconnecting said cylinders; a plurality of pistons slidably disposed, one each, in said cylinders and secured to the other of said members; compressible fluid under pressure greater than atmospheric pressure in said cylinders normally urging said pistons in the direction whereby said buttplate member is moved rearwardly of the gun, and yieldably resisting movement of said pistons in the opposite direction; a valved-inlet communicating with said cylinders and accessible exteriorly of said stock member; and means for limiting the rearward movement of said buttplate member.

4. A gun of the class described which includes: a short stock member affixed to the gun barrel; a cheek protector member including a shoulder engaging portion and telescopically mounted on said stock member for relative movement forwardly and rearwardly of the gun; a sealed cylinder mounted on one of said members and arranged with its longitudinal axis extending generally forwardly and rearwardly of the gun; a piston slidably disposed in said cylinder and secured to the other of said

members; a compressible fluid in said cylinder; sealing means on said piston substantially preventing passage of said fluid outwardly between the walls of said piston and cylinder; means in said cylinder normally yieldably urging said piston in a direction whereby said cheek protector member is moved rearwardly of the gun; and means limiting said rearward movement of said cheek protector member.

5. A gun of the class described which includes: a short stock member affixed to the gun barrel; a cheek protector telescopically mounted on said stock member for relative movement along the direction line extending generally forwardly and rearwardly of the gun; a buttplate member detachably and rigidly secured to said cheek protector; a plurality of spaced-apart cylinders mounted on one of said members with their longitudinal axes arranged parallel to said direction line; means forming fluid passages interconnecting said cylinder; a plurality of pistons slidably disposed, one each, in said cylinders and secured to the other of said members; compressible fluid under pressure in said cylinders normally urging said pistons in directions whereby said cheek protector is moved rearwardly of the gun, and yieldably resisting movement of said pistons in the opposite directions; a valved-inlet communicating with said cylinders, said



valved-inlet normally being covered by said cheek protector but being accessible exteriorly of said stock member upon detachment of said buttplate member from said cheek protector and removal of said cheek protector from said stock member; and means cooperable with said cylinders and said pistons to limit the rearward movement of said cheek protector.


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