

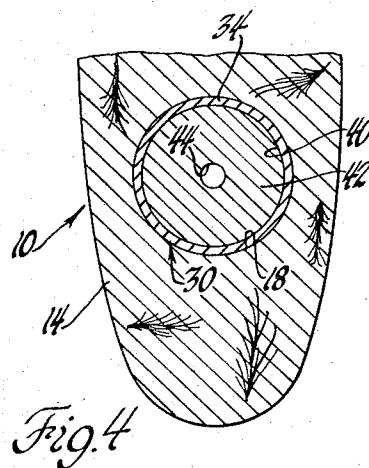
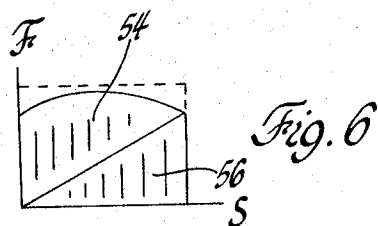
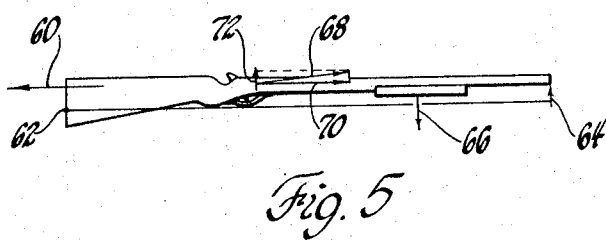
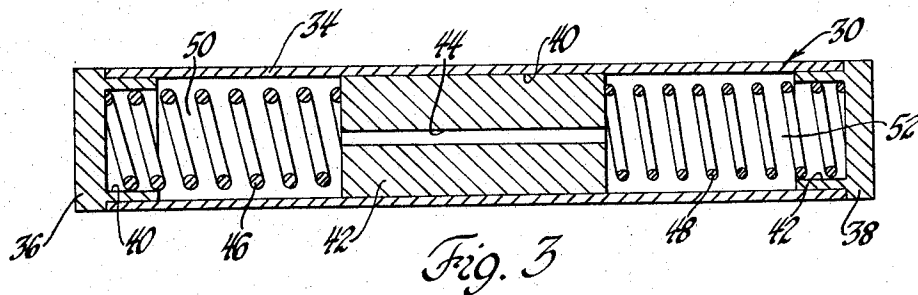
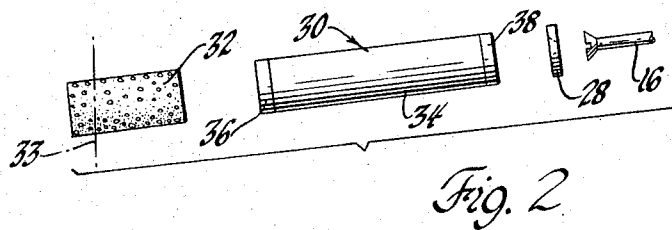
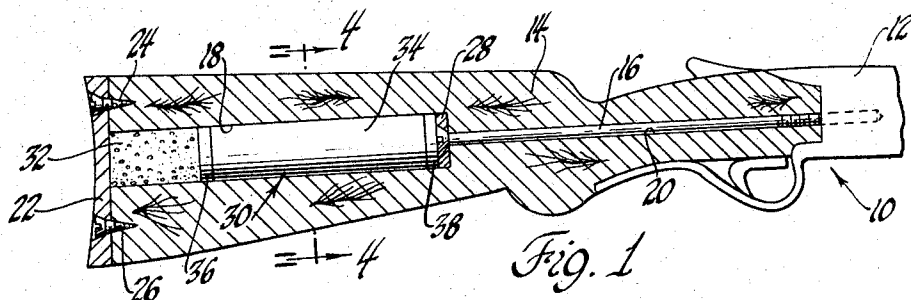
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3,300,889

RECOIL SNUBBER FOR GUNS

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RECOIL SNUBBER FOR GUNS

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This invention relates to fire arms in general and more particularly to a recoil snubbing mechanism for use with rifles, shot guns, and other like small arm devices.

Considerable difficulty, inconvenience and personal injury is experienced every year and the year around by hunters and skeet trap shooters alike due to the recoil and kick of almost all guns when they are fired. Professional hunters and riflemen are known to spend great sums for different guns with better "weight" and "balance" characteristics to offset this problem. And many different solutions to the problem have been offered.

The most recent and notable solution offered to absorb the shock of recoil, when a gun is fired, is the so-called hydracoil system. This makes use of fluid piston cylinders which are mounted in a gun barrel stock and are connected to a butt plate and sleeve arrangement fitted about the stock. The device is very expensive, completely changes the appearance of the gun, or at least the stock, thusly making its presence known, and has not proven overly effective.

Those who own expensive guns do not like the appearance of plastic stocks, usually present with known shock absorbing devices. Not only is the general appearance objectionable, but the plastic material may crack and is usually cold, damp, and slippery in service. Further, and perhaps of greater importance than at first apparent, the pride of a sportsman precludes the known and obvious use of artificial means to improve his skill.

Although other like devices with shock absorbing springs and/or recoil pads or like devices have been tried, nothing is known to have come very close to solving the problem up until now.

This invention is directed to a device which may be wholly and completely disposed within the stock or handle of a small fire arm device. It is small, compact, relatively simple to manufacture, assemble and install, and highly effective in use. It does not alter the appearance of the gun in which used nor does it require extensive work to enable its use with a gun.

It is an object of this invention to provide a recoil absorbing or snubbing device which includes a cylindrical member that may be fitted into the tang screw bore, in the stock of a gun, or like access for shock absorbing purposes.

It is an object of this invention to provide a device which will butt against the gun barrel, in essence, to better receive and dissipate the shock force incident to firing of the gun.

It is an object of this invention to make use of the ordinary construction of the conventional type gun to accommodate the device in question and to require no alteration thereto in most instances.

It is an object of this invention to provide a closed and sealed assembly for use in the stock of a gun and which includes a weighted member fitted in a cylinder and positioned between the closed ends of the cylinder by centering springs. The initial effect of the weighted member to a shock load, in combination with the spring

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forces, fit of the member in the cylinder and metered bleeding of entrapped air contributes to the effectiveness of the device.

These and other objects and advantages to be gained in the practice of this invention will be better understood and appreciated upon a reading and study of the following specification in regard to a preferred embodiment of the invention and with particular reference to the accompanying drawing.

In the drawing:

FIGURE 1 is a partially cross-sectioned view of the stock end of a rifle showing the present invention in use therewith.

FIGURE 2 is an exploded view of the various parts inserted with the present invention in the stock of a rifle or other gun.

FIGURE 3 is an enlarged and cross-sectioned elevational view of the device of this invention.

FIGURE 4 is a cross-sectioned, fragmentary and enlarged view of the gun stock shown in the first figure as seen in the plane of line 4—4 and showing the device hereof provided therein.

FIGURE 5 is a diagrammatic sketch of a rifle with vector force arrows incident to the firing thereof shown in connection therewith.

FIGURE 6 is a force-distance diagram of the shock absorbing characteristics of the device heretofore shown.

The gun 10 shown in the first drawn figure includes a frame or receiver part 12 including the barrel (not shown in the first figure) which has the wooden stock 14 secured to it by a tang screw 16. The tang screw is accessible through a bore 18 in the stock and it extends from the end of the bore through a close fitting hole 20 to where the screw is threaded into engagement with the receiver 12.

A butt plate 22 closes the tang screw bore or hole 18 and it is held engaged to the end of the stock 14 by a couple of screws 24 and 26 either or both of which are easily removed.

The bore hole 18 is at a slight angle and passes upwardly from the butt plate 22 towards the receiver 12.

The tang screw may be a round or flat headed screw, as shown, and seats in a washer 28 at the bottom of the bore hole 18.

A recoil snubbing device 30, including the inventive aspects of the present invention, is provided in the bore hole 18 and is seated against the end of the tang screw 18 and against the washer 28 at the bottom thereof. Behind it is provided a styrofoam core plug 32 which is cut to size, as shown by the phantom line 33 of FIGURE 2, when it is installed.

The snubbing device 30 is of substantially the size and fit to be readily received in the bore hole 18 without forcing and without undue clearance. Further, the core plug 32 holds it snug and against movement laterally or endwise in the bore hole.

Referring now to FIGURE 3:

The recoil snubbing device 30 includes a hollow tubular member 34 which is closed by members 36 and 38 at its ends. Within the chamber space 40, in the tubular member 34, is provided a solid weighted cylindrical member or mass 42. It is close fitted to the tubular member, but is relatively movable therein and has an air bleed metering orifice 44 provided axially through it.

The end closure members 36 and 38 include spring seat cups 40 and 42, respectively, in which are received the outer disposed ends of compression springs 46 and 48. The springs are open wound helical springs which have an outer diameter smaller than the inner dimension of the tubular member 34 so that they are received in concentric spaced relation therein.

The mass 42 is of a known weight and the springs 46 and 48 provide a known compressive load at rest, being in partial compression as installed, and a known force-distance load in service.

The mass 42 is fitted to the tubular member 34 with minimum clearance, but it is also prepared for minimum frictional resistance in the relative movement of one to the other. This causes air compressive chamber spaces 50 and 52 to be formed and provided on opposite sides of the weighted member 42.

With the weight of the mass 42, force of the springs 46 and 48, size of the clearance and air compressive chamber spaces 50 and 52, and size of the air bleed orifice 44 all known, the inertial responsive of the mass 42 to a shock load, such as is incident to firing a gun, can be readily computed and adjusted to best suit the circumstances.

As will be later described, the angular disposition of the shock absorbing device 30 and its shock transmitting engagement with the gun barrel are also factors to be taken into consideration and are a part of this invention.

In field service, a slight weight in the stock of a gun is often added to enable the gun to point faster, smoother and with greater ease. This is commonly done with skeet, trap and field shooting and contributes to being able to get off a second shot.

Many guns are provided with a bore hole in the stock for this purpose, as well as for access to the barrel retaining tang screw when it is present. Accordingly, in most instances the bore hole 18 for the shock absorber or snubber 30 of this invention will not have to be specifically provided.

It is important that the bore hole 18 for the snubber 30 to be at an angle of about 15°, however, and where a hole is not already provided, as in custom stocks, care should be exercised to meet this general requirement. In most guns the required angle is a normal incident of passing the tang screw through the neck of the stock from its butt end.

The snubber 30 is hermetically sealed so that it is free of dust, grit and dirt and should not be tampered with in service.

The springs 46 and 48 are sufficiently stiff so that, with the air compression resistance in the end chamber spaces 50 and 52, the mass 42 will not bottom if tapped against a fixed surface nor under the shock load expected in service.

It will be appreciated that what happens when the gun 10 is fired is that the initial response of the gun, the tendency to move rearwardly or "kick," is resisted by the inertial effort of the mass 42. With the mass 42 seeking to stay at rest, the tubular member 34 moves with the gun stock in which provided, and the relative movement of the mass forward is resisted by both the forwardly disposed spring 48 and the compressive load that builds up in the chamber space 52 in front of the piston-like inertial responsive mass.

The resistance of the spring 48 increases with the relative movement of the mass 42 and accordingly, alone, would need a longer stroke before it could become effective.

On the other hand, the resistance of the air compressive load in the chamber space 52 is almost immediate, without the bleed hole 44, and of itself would not be less effective.

Further, with both the spring 48 and the air compressive load 52 on the piston mass 42, taken alone or together, the energy built up would later be dissipated in

a forward kick of the gun which would be equally as objectionable as the reactive kick intended to be eliminated.

The air bleed orifice 44 eliminates this problem in providing a controlled air bleed and with it the spring force and air compressive loads may be used together to give a more constant and less reactive snubbing action than would otherwise be possible.

Reference to FIGURE 6 discloses the damping force 54 of the air compressive space and that of the spring force, identified 56. The air compressive resistance builds up at first, due to the air bleed orifice, and also provides for a dissipation near the end of the reactive stroke of the mass 42. Although not specifically shown, it will be appreciated that the effort of the reactively compressed spring 48 to move the piston mass 42 back is resisted by the compressive load which is shifted to the other side of the piston mass and that the metering orifice again comes into service.

FIGURE 5 is a vector analysis of the recoil effect in firing the gun 10 and shows the countering effect of the snubber 30 of this invention. The recoil force is represented by the arrow 60 and its radial distance above the axis of pivotal support for the gun 10, identified as 62 on the butt end of the gun stock, explains the moment force which is what causes the muzzle end of the gun to lift, or whip, if not on true center; as represented by the smaller arrow 64 at the greater distance from the pivotal axis.

The upward kick of the gun 10 is resisted by the downward force or pull of the person shooting the gun, represented by the arrow 66 under the barrel and where it is normally held in being steadied, aimed and fired.

The snubbing device 30 of this invention being engaged to the tang screw 18 which is in turn engaged to the gun barrel, is in direct shock transmitting engagement with the barrel and the force vectors are accordingly shown at the point of the engagement of the barrel to the gun stock.

Since the snubber 30 is at an angle, the resistance force represented by the arrow 68 includes the components shown by arrows 70 and 72. The larger force acts in opposition to the recoil force of vector force arrow 60 and the smaller component is in a moment cancelling relation to the vector force arrow 66 relative to the intermediate support position of the barrel.

From the foregoing, a general appreciation of the effectiveness of the present device should be more apparent and better understood.

The simplicity of parts, their construction and manufacture, ease of assembly, etc. are considered self-evident.

Although a preferred form of the present invention has been shown and described, this is done without intent to unduly limit the scope or spirit of the invention. Accordingly, the invention is to be given the full scope of the language of the hereinafter appended claims except as expressly limited thereby.

I claim:

1. Means for snubbing weaponry recoil in shoulder-fired armament, and comprising:
 - a shoulder-fired weapon having a stock and a barrel frame attached thereto,
 - a bore hole provided in said stock and axially aligned towards the end of said barrel frame engaged to said stock,
 - a tubular member closed at opposite ends and having an inertial responsive mass provided centrally therein,
 - said mass being close fitted in said tubular member and having an air bleed orifice provided therethrough,
 - spring means in compression between the ends of said tubular member and the ends of said mass for holding and returning said mass to a balanced position centrally within said tubular member,
 - and means for holding said tubular member securely

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in said bore hole for disposing said mass in inertial responsive resistance to the recoil effort in the firing of said weapon.

2. The weaponry recoil snubbing means of claim 1, said bore hole being provided in the terminal end of said stock and having shock transmitting means provided between the inner end thereof and the barrel frame of said weapon. 5
3. The weaponry recoil snubbing means of claim 1, said tubular member being hermetically sealed and said air bleed orifice being provided centrally through said inertial responsive mass. 10

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