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RECOIL ABSORBING STOCK ASSEMBLY

Filed June 6, 1963

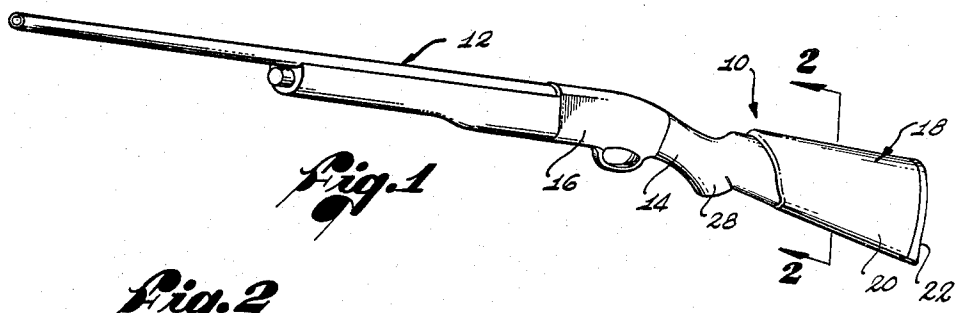
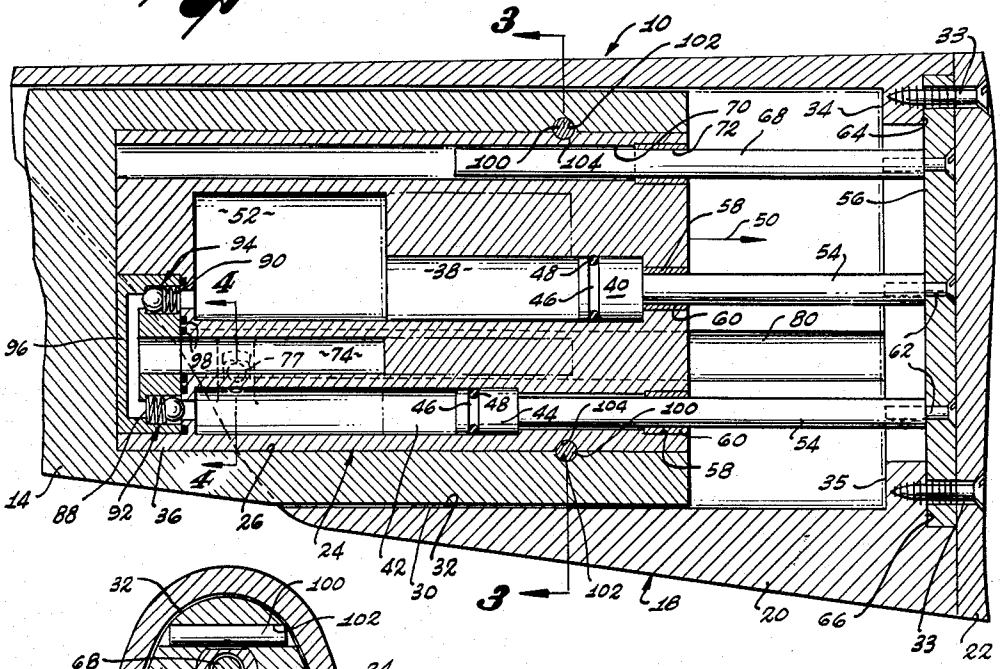


Fig. 1

Fig. 2



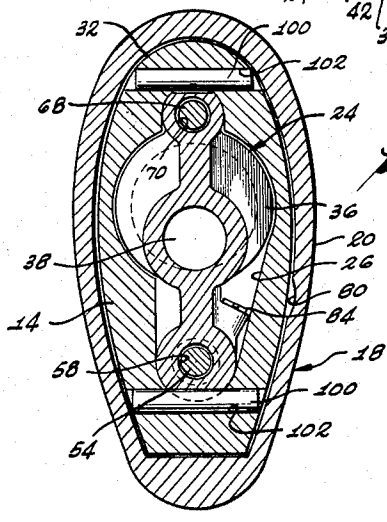


Fig. 3

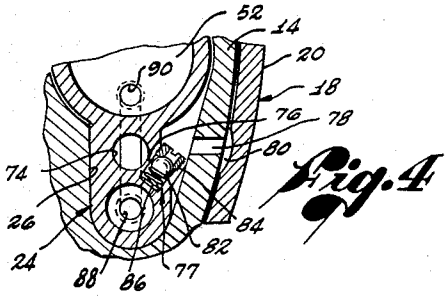


Fig. 4

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RECOIL ABSORBING STOCK ASSEMBLY

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This invention relates to recoil absorbing mechanisms for firearms, and more partciularly to an improved recoil absorbing stock assembly for firearms, such as shotguns and rifles which are intended to be fired by a shooter from a shoulder position.

The stock assembly of the invention constitutes an improvement over the one disclosed in my United States Patent No. 3,039,222, issued June 19, 1962, and entitled Gun Stock With a Compressible Fluid Recoil Absorber.

As is well known, the discharge of a firearm is accompanied by recoil or "kick" as it is commonly termed. The magnitude of the kick depends upon many factors including the quantity and nature of the powder load and various properties of the firearm, such as its weight. Under virtually all circumstances, this kick is highly undesirable, and particularly so in the case of modern firearms, as technical advances have enabled them to be made extremely light in weight and the efficiency of powder to be materially increased. These advances in the art improve the overall performance of the firearm and enhance its portability, but at the same time increase the kick.

Besides the temporary discomfort associated with recoil or kick, it has other undesirable effects. First, it tends to materially impair the shooter's accuracy. Inexperienced shooters, and occasionally even experienced ones, tend to anticipate the discharge of the firearm and pull away or "flinch" causing the firearm to be drawn off target.

In addition, extensive medical tests have established that recoil, particularly where a large number of rounds are fired in a relatively short period of time, is detrimental from a health standpoint and occasionally the cause of headaches, dizziness, and nauseau, not to mention the damage to the tissue of the shoulder in the region immediately behind the butt plate. When kick is absorbed by a shooter, a substantial increase in his pulmonary pressure immediately takes place. This, in turn, tends to arrest the flow of venous blood and frequently reverses the direction of its flow. In either case, a severe shock load is applied to the heart. The recoil produced by conventional firearms with conventional factory loads is ample to increase the pulmonary pressure to a level such that it is potentially dangerous from a health standpoint as well as capable of producing the above noted symptoms.

Therefore, it will be readily understood that a stock assembly which is capable of greatly reducing kick is a highly desirable adjunct to a modern firearm.

There are certain design requirements which must be met if a recoil absorbing stock assembly of the subject type is to meet with widespread acceptance. The presently used gun stock design has been in use throughout the world for many years, and shooters are familiar with the "feel" of a firearm with a stock of this type. Thus, a successful assembly must conform in size, shape, weight, and balance to this generally accepted design.

In view of the foregoing, it is a primary object of this invention to provide an improved recoil absorbing stock assembly, which is highly effective in reducing the kick absorbed by a shooter upon discharge of a firearm.

A more specific object is to provide a recoil absorbing stock assembly for a firearm, which greatly reduces the kept kick absorbed by the shooter, as compared to a like firearm equipped with a conventional stock, and which conforms in size, shape, weight, and balance to a stock of conventional design.

A further object of this invention is to provide a stock

assembly of the type described, which is durable and reliable performing its intended function even after prolonged periods of use or non-use, or a combination thereof.

It is another object of this invention to provide an improved recoil absorbing stock assembly utilizing a pneumatic unit containing compressed air to cushion the shock of recoil, the pressure of the air within the unit being automatically maintained at the desired level.

A still further object is to provide an assembly of the type described capable of accomplishing all of the foregoing objects, yet which is simple in construction and, hence, economical to manufacture.

These and other objects, features, and advantages of the invention will be better understood by referring to the following detailed description taken in conjunction with the accompanying drawing in which:

FIGURE 1 is a perspective view of a shoulder-held firearm equipped with the recoil absorbing stock assembly of the invention;

FIGURE 2 is a longitudinal sectional view, taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a sectional view, taken along the line 3—3 of FIGURE 2; and

FIGURE 4 is a partial sectional view, taken along the line 4—4 of FIGURE 2.

Referring to the drawing, numeral 10 designates generally the stock assembly of the invention installed on a conventional shotgun 12. In this latter connection, it will be understood that the assembly has useful application on all types of firearms which are fired from a shoulder position, including sporting shotguns and rifles and military firearms.

The assembly 10 includes in general a short stock 14 connected to the receiver 16 of the shotgun, and a member 18 comprising a rigidly connected cheek piece 20 and butt plate 22 telescopically receiving the stock 14 and movable forwardly and rearwardly thereto. A pneumatic unit 24 operatively connects the stock 14 and member 18 and yieldably urges the latter to its relative rearward position. It is noted that in use the member 18 remains substantially stationary against the shooter's shoulder, while the stock 14 telescopes rearwardly upon discharge of the firearm. For convenience of description, however, the member 18 is said to move, it being understood that such movement is relative.

The various parts including the stock 14 and member 18 preferably are formed of plastic, except when otherwise stated. The family of polyesters commonly known as ABS (acrylontrile-butadiene-styrene) resins have been found to be particularly advantageous. Such materials have high impact strength, good resistance to abrasion and are capable of withstanding severe temperature changes. Moreover, they may be readily formed into the desired shapes. It will be understood, however, that the invention may be successfully practiced when these various parts are formed of a wide variety of materials.

The stock 14 is shaped generally like a conventional stock, although slightly shorter than normal. It has a height in vertical cross section greater than its width at all locations along its length. At its forward end, the stock 14 is attached to the receiver 16 of the shotgun, as previously noted, and at its rearward end it is provided with a forwardly extending recess 26 for mounting the pneumatic unit 24. Formed adjacent the forward end is a pistol grip 28. Rearwardly of the grip 28, the stock progressively increases in thickness joining a rearward portion 30, which is of substantially uniform cross section along its length. Providing it with such a cross section enables the member 18 to make sliding contact with the stock 14 over the entire length of rearward portion 30 during relative movement of the parts.

The cheek piece 20 comprises a hollow member with

open ends and with an inner periphery 32 of a shape corresponding to that of the rearward portion 30 of the stock 14, so that it telescopically receives that portion in close sliding contact. Preferably, as illustrated in FIGURE 3, the cheek piece 20 is of wrap around construction, i.e. it encompasses the entire rearward portion 30 of the stock. In cross section, the height of the cheek piece 20 progressively increases from front to rear so that when it is properly assembled with the stock 14, the overall shape of the assembly conforms to that of a conventional stock. For the purpose of insuring good sliding contact over a substantial area and at the same time affording ample space for the shooter's hand on the pistol grip 28, the forward end of the cheek piece 20 is tapered rearwardly from top to bottom.

With a cheek piece of the present construction, which is identical on its opposite sides, the assembly 10 is adapted for use by either right handed or left handed shooters. In some instances, it may be desirable to build up cheek piece 20 on one side or the other to afford a cheek rest shaped in accordance with the requirements of a particular shooter. This, of course, limits the use of the stock assembly to either a right or left handed shooter, depending upon the side which is so formed, however, the function of the assembly remains the same. As the term cheek piece is used herein, it applies to any such smooth or configurated element against which the shooter places his cheek when the gun 12 is positioned for firing.

The butt plate 22 has a perimeter that conforms to the external shape of the cheek piece 20 at its rearward end so that when it is attached to the cheek piece, it serves as an extension thereof. Attachment of the butt plate 22 to the cheek piece is achieved by any suitable means, as by screws 33. To strengthen the member 18 at the connection and also to afford stops for limiting the forward movement of the member 18 relative to the stock 14, inturned upper and lower flanges 34 and 35, respectively, are provided at the rearward end of the cheek piece 20.

Movement of the member 18 is between the rearward and forward limit positions, illustrated in full and phantom lines, respectively, in FIGURE 2. Such movement is along a direction line 50 oriented substantially parallel to the longitudinal axis of the gun 12.

The pneumatic unit 24 for operatively connecting the stock 14 and member 18 and for cushioning recoil embodies a housing 36 for mounting the parts. The housing is shaped so as to be received in tight fitting engagement within the recess 26 in the rearward end of the stock 14 and at the same time to conserve on material. Thus, as may be seen in FIGURE 3, it does not occupy all the space within the recess 26. A pair of cylinder-piston units including a main cylinder 38 and associated piston 40, and a charging cylinder 42 and associated piston 44 are provided within the housing 36. The diameter of the main piston 40 is preferably larger than that of the charging piston 44. Escape of compressible fluid between the engaging walls of the pistons and their cylinders is prevented by providing each of the pistons 40 and 44 with an annular groove 46 that receives a resilient, deformable O-ring 48.

The cylinders 38 and 42 are vertically spaced from one another and arranged with their longitudinal axes parallel to the direction line 50. The main cylinder 38 is substantially enlarged adjacent its forward end, as at 52, so that when the piston 40 is in its forward limit position, the volume remaining within the working portion of the cylinder, i.e. to the left of the piston 40 in FIGURE 2, comprises a major part of its initial volume. In contrast, in the forward limit position of the charging piston 44, the volume remaining in the working portion of the cylinder 42 comprises a minor part of its initial volume. This volumetric relationship plays an important part in the functioning of the unit 24, as will be brought out more fully below.

Connections of the pistons 40 and 44 with the member 18 is achieved by means of a pair of piston rods 54, preferably formed of light weight metal, and an end plate 56. Each rod 54 is connected to its respective piston and projects rearwardly through a bore 58 in the housing 36. Good bearing contact is insured by providing metal bushings 60 on the housing for engaging the rods 54. At their rearward ends, the rods are connected, as by screws 62, to the end plate 56. As illustrated in FIGURE 2, the end plate 56, in turn, is seated at its upper and lower ends in recesses 64 and 66 in flanges 34 and 35, respectively, so that its rearward end is flush with the end of the cheek piece 20. The end plate 56 is maintained in its seated position by virtue of being clamped between the cheek piece 20 and the butt plate 22 when these parts are connected.

As is apparent, if so desired the mounting arrangement could be reversed by connecting the housing 36 to the end plate 56 and the rods to the stock 14 without any change in mode of operation. However, from a manufacturing standpoint, it is desirable to connect the parts as shown.

In some instances, it may be desirable in order to insure against binding of the assembly during use to provide a guide rod 68 at a location vertically spaced about the cylinder-piston units 38–40 and 42–44. The guide rod is receivable in a bore 70 in the housing in sliding contact with the bushing 72. As in the case of the piston rods 54, the guide rod 68 is attached to the end plate 56.

It will be seen in FIGURE 2 that with the stock 14 and member 18 operatively connected in the manner described, relative movement of the member takes place between forward and rearward limit positions. As previously noted, the forward limit position is established by the flanges 34 and 35 abutting the rearward end of the stock 14. It will be appreciated that during use the stock 14 does not forcefully strike the flanges, since the shock is cushioned by the compressible fluid, here comprising air, which is compressed in the working portions of the cylinders 38 and 42. The rearward limit position of the member 18 is established by the pistons 40 and 44 abutting the ends of their respective cylinders, as shown in FIGURE 2.

The member 18 is yieldably urged toward and maintained in its rearward limit position by compressed air in the working portion of the main cylinder 38 and to some extent by compressed air in the charging cylinder 42. Air is supplied to the main cylinder 38 to build up and maintain the desired pressure therein through means including the charging cylinder-piston 42–44, a storage chamber 74, and a plurality of valved passageways.

The charging cylinder 38 draws air in through a passageway 76 (FIGURE 4) in the housing 36 opening to the recess 26 in the stock 14. Good communication from the recess 26 to the exterior of the assembly is insured by providing a bore 78 extending transversely through the wall of the stock 14 and communicating with a longitudinally extending groove 80 in the inner wall of the cheek piece 20. Referring to FIGURE 2, it may be seen that the groove 80 extends substantially the entire length of the cheek piece. Accordingly, air which might otherwise be trapped between the end of the stock 14 and end plate 56 is rapidly bled off and, conversely, there is no possibility of a vacuum being created therein, thereby insuring proper functioning. It will be understood that this same effect could be achieved by making the stock 14 and member 18 so that they fit together rather loosely.

Installed in the passageway 76 is a check valve 77 which permits flow of air from the atmosphere to the cylinder 38, but blocks flow in the opposite direction. This valve includes a ball 82 urged to a seated position against a threaded insert 84 by a light coil spring 86. When the ambient pressure exceeds the pressure within the working portion of the cylinder 42, the ball 82 is urged off its seat and such flow takes place.

The storage chamber 74 is formed in the housing 36 in the present case at a location between the cylinders 38 and 42. It, in turn, is connected to the cylinders by passageways 88 and 90, respectively. The passageway 88 has installed therein a check valve 92 which permits flow from the cylinder 42 to the chamber 74, but blocks flow in the opposite direction. On the other hand, the passageway 90 contains a check valve 94 that permits flow from the chamber 74 to the cylinder 38, but blocks reverse flow.

In the illustrative embodiment, the check valves 92 and 94, similar to the check valve 77, are of the ball type. For convenience of manufacture, the housing 36 is afforded with a removable element 96 formed with passageways 88 and 90 and containing the check valves 92 and 94. To insure sealing between the element 96 and the remainder of the housing 36, a plurality of gaskets 98 are provided between the mating faces. The element is maintained in assembly by virtue of the fact that it abuts the end wall of the recess 24 when the housing 36 is installed therein.

With this arrangement, it will be observed that the maximum pressure, which the charging piston 44 is capable of developing in its cylinder in a single stroke, assuming the check valve 94 does not open, is substantially equal to the pressure maintained in the storage chamber 74. Further, it is substantially equal to the minimum pressure maintained within the working portion of the main cylinder. For convenience of reference, this pressure is hereinafter referred to as the control pressure. The valved passageway 76 insures that a zero (ambient) pressure exists in the charging cylinder 42 when the piston 44 is in its rearward limit position of FIGURE 2.

In assembling the various parts of the stock assembly 10, the pneumatic unit 24 is first inserted in the recess 26 in the rearward end of the stock 14. For maintaining the unit in the desired position in the recess, a pair of locking pins 100 (FIGURES 2 and 3) are provided. Each of the pins is receivable in a bore 102 extending transversely across the stock 14 and opening in its central region to the recess 26. When the unit 24 is properly positioned, grooves 104 on its exterior surface are aligned with the bores 102 so as to receive portions of the pins 100.

In the next step of the assembly operation, the cheek piece 20 is slipped over the rearward portion 30 of the stock 14 and moved forwardly sufficiently to expose the rearward ends of the rods 54 and 68. The end plate 56 is connected by the screws 62 to the rods and, finally, the butt plate 22 is secured by screws 33 to the cheek piece to clamp the end plate in position.

Once, the stock assembly 10 is in the assembled condition illustrated in the drawings, the main cylinder 38 may be charged up to the control pressure by actuating the member 18 toward the stock 14. This can be accomplished in a variety of different ways, as by manually working the parts, or by simply firing the gun.

Assuming that a zero (ambient) pressure initially exists in the work portions of both cylinders 38 and 42 and in the storage chamber 74, a given charging stroke causes air to be compressed in the cylinders. In the case of the main cylinder 38, outward flow of pressurized air is blocked by the check valve 94. On the other hand, in the case of the charging cylinder 42, the check valve 92 opens upon a positive pressure being created to permit flow to the storage chamber 74. If, during this initial stage, the pressure in the chamber 74 should exceed the pressure in the main cylinder 38, the check valve 94, of course, opens to permit a balancing to take place.

When the force causing movement of the stock 14 and member 18 toward one another is released, the compressed air in the cylinders 38 and 42 causes the pistons 40 and 44 and, hence, the stock and member 18 to commence return movement toward the relative positions of

FIGURE 2. The check valve 92 closes immediately resulting in a positive pressure being maintained within the storage chamber 74. Responsive to the pressure in the cylinder 38 dropping below the chamber pressure, as will obviously take place during the initial return stroke, the check valve 94 opens to permit balancing to take place. In addition, the check valve 77 opens to permit air to be drawn into the charging cylinder 42 to prepare the unit for the next charging stroke.

After a sufficient number of strokes, a stable condition is reached, wherein the pressure in chamber 74 is substantially equal to the control pressure, and the minimum pressure in the main cylinder 38, i.e. the pressure existing in the position of FIGURE 2, is likewise substantially equal to this control pressure. The check valve 92 then remains closed during movement of the member 18 to its forward limit position, and the positive pressure in the charging cylinder 42 assists that in the main cylinder in yieldably resisting movement.

By way of specific example, it has been found advantageous to construct the unit 24 so that the control pressure equals 40 p.s.i.g. Therefore, the pressure, which the cylinder-piston unit 38–40 is capable of developing in a full stroke when the valve 92 does not open, is equal to 40 p.s.i.g. Further, the pressure normally existing in the chamber 74 and the minimum pressure in the main cylinder 38 is likewise substantially equal to 40 p.s.i.g. The main cylinder 38 by virtue of having a volume in the forward limit position of the piston 40 comprising a major portion of the volume in the rearward limit position, incurs a nominal increase in pressure during such movement. For example, it has been found desirable to size the parts such that the increase is from 40 to 50 p.s.i.g.

With the unit fully charged in the manner described above, it will be readily appreciated that when the gun 12 is fired, the recoil or kick is resiliently cushioned by virtue of the air being compressed in the working portions of both the main and charging cylinders 38 and 42. Since the pressure within the main cylinder 38 is greater at all times under normal operating conditions than in the charging cylinder 42, and since the diameter of the main piston 40 is greater than that of the charging piston, the greater thrust in resisting recoil is exerted by the main cylinder-piston unit 38–40. By virtue of its central location with respect to the butt plate 22, there is no tendency for the unit to bind. Moreover, the rod 68 and charging cylinder-piston unit 42–44 have a girding effect and further insure against binding.

Subsequent to firing and kick, the rapid return of the member 18 of the rearward limit position is assured, because of the positive pressure existing within the cylinders 38 and 42, and particularly within the main cylinder 38. The cheek piece 20 remains stationary against the shooter's cheek, and the stock 14 telescopes rearwardly into the member 18. Thus, the shooter's head stays properly positioned for subsequent shots, and there is no chafing of the skin.

An important feature of the stock assembly of the invention is that a reserve supply of compressed air to maintain the unit 24 charged is afforded by the storage chamber 74. If, for any reason, the pressure in the cylinder 38 should drop off, as might conceivably take place if the gun were to sit idle for long periods of time, air is bled in from the storage chamber 74 to maintain a positive pressure. Moreover, when the gun is subsequently fired a few times, the storage chamber 74 and cylinder 38 are quickly brought up to control pressure because of the action of the charging cylinder-piston unit 42–44. Accordingly, even after extremely long periods of non-use or after use and normal wear of the moving parts, the utility of the assembly is maintained.

Although one embodiment of the invention has been illustrated and described in considerable detail, it will be understood that this is only by way of example and

that various changes in the construction and arrangement of the various parts may be made without departing from the spirit and scope of the invention.

I claim:

1. A recoil absorbing stock assembly, comprising:
a short stock having forward and rearward ends and adapted to be affixed at its forward end to the receiver of a firearm;
a member embodying a butt plate and a cheek piece secured to one another, and telescopically mounted on said stock for movement forwardly and rearwardly relative thereto along a direction line;
a cylinder mounted on said stock and having its longitudinal axis oriented substantially parallel to said direction line;
a piston slidably mounted in said cylinder for movement between forward and rearward limit positions and secured to said butt plate;
compressible fluid under a predetermined control pressure greater than ambient pressure in said cylinder yieldably urging said piston toward its rearward limit position;
and means responsive to the pressure of said fluid in said cylinder dropping below said control pressure for automatically supplying additional pressurized fluid to said cylinder to raise the pressure therein substantially to said control pressure.

2. A recoil absorbing stock assembly, comprising:
a stock member having forward and rearward ends and adapted to be affixed at its forward end to the receiver of a firearm;
a member embodying a butt plate mounted on said stock member for movement forwardly and rearwardly relative thereto along a direction line;
a cylinder mounted on one of said members and having its longitudinal axis oriented substantially parallel to said direction line;
a piston slidably mounted in said cylinder and secured to the other of said members;
compressible fluid under a predetermined control pressure greater than ambient pressure in said cylinder yieldably urging said piston in the direction whereby said butt plate member is moved rearwardly relative to said stock member;
a storage chamber connected to said cylinder for storing air under a pressure at least equal to said predetermined pressure;
valve means responsive to the pressure in said cylinder dropping below said control pressure for admitting pressurized air from said chamber into said cylinder;
and charging means actuated by movement of said butt plate member relative to said stock member for compressing air and supplying it to said chamber.

3. The subject matter of claim 2 further characterized in that said charging means is actuated during movement of said butt plate member forwardly relative to said stock member.

4. A recoil absorbing stock assembly, comprising:
a stock member having forward and rearward ends and adapted to be affixed at its forward end to the receiver of a firearm;
a member embodying a butt plate and a cheek piece secured to one another, and telescopically mounted on said stock for movement forwardly and rearwardly relative thereto along a direction line;
a cylinder mounted on one of said members and having its longitudinal axis oriented substantially parallel to said direction line;
a piston slidably mounted in said cylinder and secured to the other of said members;
air under pressure greater than ambient pressure in said cylinder yieldably urging said piston in a direction whereby said member embodying said cheek piece and said butt plate is moved rearwardly relative to said stock member;

a chamber for storing air under pressure;
passage means fluid connecting said cylinder and said chamber;
valve means in said passage means blocking flow from said cylinder to said chamber, but permitting flow in the opposite direction, whereby the pressure in said cylinder is substantially equal to or greater than the pressure in said chamber;
and means including a charging cylinder-piston unit actuated by relative movement of said members for compressing air to a predetermined control pressure and supplying it to said chamber to maintain the pressure therein substantially equal to said control pressure.

5. A recoil absorbing stock, comprising:
a stock member having forward and rearward ends and adapted to be affixed at its forward end to the receiver of a firearm;
a member embodying a cheek piece encompassing the rearward end of said stock member and a butt plate rigidly secured to said cheek piece, said last mentioned member being movable forwardly and rearwardly relative to said stock member along a direction line;
a cylinder mounted on one of said members and having its longitudinal axis oriented substantially parallel to said direction line;
a piston slidably mounted in said cylinder and secured to the other of said members;
compressible fluid under a predetermined control pressure greater than ambient pressure in said cylinder yieldably urging said piston in a direction whereby said member embodying said cheek piece and said butt plate is moved rearwardly relative to said stock member;
and means responsive to the pressure of said fluid in said cylinder dropping below said control pressure for automatically supplying additional pressurized fluid to said cylinder to raise the pressure in said cylinder substantially to said control pressure.

6. A recoil absorbing stock assembly, comprising:
a short stock having forward and rearward ends, and adapted to be affixed at its forward end to the receiver of a firearm and having a recess at its rearward end;
a member embodying a cheek piece and a butt plate rigidly connected to one another, and telescopically mounted on said stock for movement forwardly and rearwardly relative thereto along a direction line;
a housing mounted in said recess;
means in said housing forming a cylinder having its longitudinal axis oriented substantially parallel to said direction line;
a main piston slidably disposed in said cylinder and secured to said member;
means in said housing forming a chamber for storing air under pressure;
passage means in said housing fluid connecting said cylinder and said chamber;
valve means in said passage means blocking flow from said cylinder to said chamber, but permitting flow in the opposite direction, whereby the pressure in said cylinder is substantially equal to or greater than the pressure in said chamber;
and charging means in said housing actuated by movement of said member forwardly relative to said stock for compressing air to a predetermined pressure greater than ambient pressure and supplying it to said chamber to maintain the pressure therein substantially equal to said control pressure.

7. A recoil absorbing stock assembly, comprising:
a short stock having forward and rearward ends and adapted to be affixed at its forward end to the receiver of a firearm;
a member embodying a butt plate and a cheek piece

rigidly connected, and telescopically mounted on said stock for movement forwardly and rearwardly relative thereto along a direction line;

a main cylinder mounted on said stock and having its longitudinal axis oriented substantially parallel to said direction line;

a main piston slidably mounted in said cylinder for movement between forward and rearward limit positions and secured to said butt plate, the volume of the working portion of said cylinder in the forward limit position of said piston comprising a major portion of the volume of the working portion of said cylinder in the rearward limit position of said piston;

a charging cylinder mounted in said stock and having its longitudinal axis oriented substantially parallel to said direction line;

a charging piston slidably mounted in said charging cylinder for movement between forward and rearward limit positions corresponding to like positions of said main piston and secured to said butt plate, the volume of the working portion of said charging cylinder in the forward limit position of said charging piston comprising a minor portion of the volume of the working portion of said charging cylinder in the rearward limit position of said charging piston;

valved passage means connecting the working portion of said charging cylinder to the exterior of said assembly for permitting flow from the atmosphere to said charging cylinder and blocking flow in the opposite direction;

a storage chamber connected to the working portions of said main and charging cylinders;

means blocking flow from said storage chamber to said charging cylinder, but permitting flow in the opposite direction;

and means blocking flow from said main cylinder to said storage chamber, but permitting flow in the opposite direction.

8. The subject matter of claim 7 further characterized in that the diameter of said main piston is greater than the diameter of said charging piston.

9. A recoil absorbing stock assembly, comprising:

a short stock having forward and rearward ends, and adapted to be affixed at its forward end to the receiver of a firearm and having a recess at its rearward end;

a member embodying a cheek piece and a butt plate rigidly connected to one another, and telescopically

mounted on said stock for movement forwardly and rearwardly relative thereto along a direction line;

a housing mounted in said recess;

means forming a main cylinder in said housing having its longitudinal axis oriented substantially parallel to said direction line;

a main piston slidably mounted in said cylinder and secured to said member;

a means forming a charging cylinder in said housing having its longitudinal axis oriented substantially parallel to said direction line;

a charging piston slidably mounted in said cylinder and secured to said member;

means forming a storage chamber in said housing;

means forming a first passageway in said housing between said charging cylinder and the exterior of said assembly;

means forming a second passageway in said housing between said charging cylinder and said storage chamber;

means forming a third passageway in said housing between said storage chamber and said main cylinder;

a first check valve in said first passageway permitting flow from the atmosphere to said charging chamber, but blocking flow in the opposite direction;

a second check valve in said second passageway permitting flow from said charging cylinder to said storage chamber, but blocking flow in the opposite direction;

and a third check valve in said third passageway permitting flow from said storage chamber to said main cylinder, but blocking flow in the opposite direction.

10. The subject matter of claim 9 further characterized in that said main cylinder is located generally centrally in said housing and in that said charging cylinder is vertically spaced therefrom;

and including a guide rod slidably disposed in said housing and secured to said member, said rod being oriented substantially parallel to said direction line and vertically spaced from said main cylinder on the side opposite said charging cylinder.

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BENJAMIN A. BORCHELT, *Primary Examiner.*