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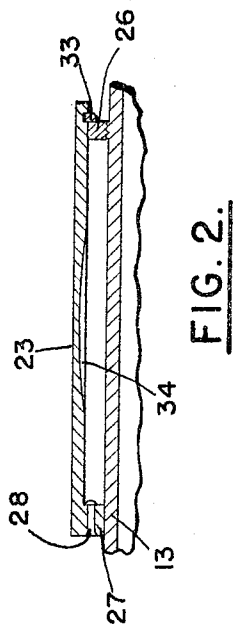
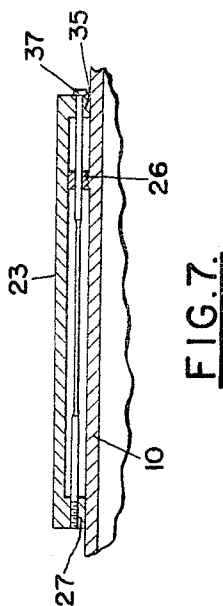
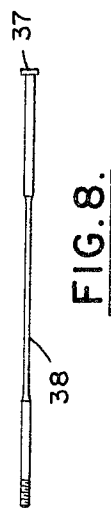
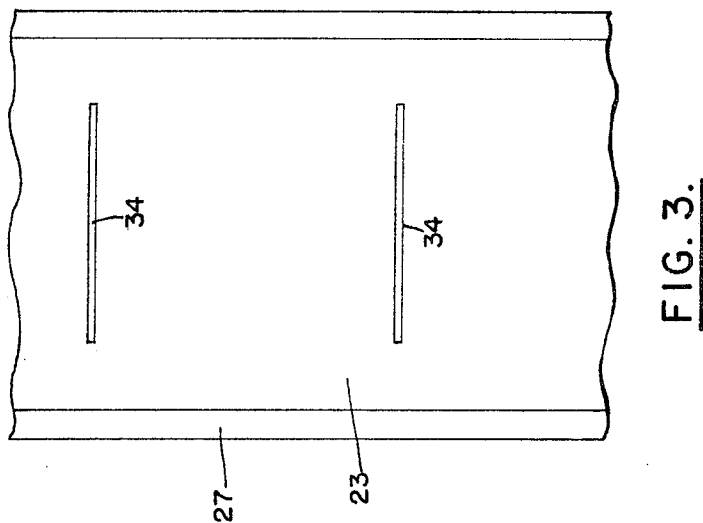
A. M. STOTT

3,270,618

CONTROLLED RECOIL WEAPON

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2 Sheets-Sheet 2



INVENTOR.
ALBERT M. STOTT
BY: *Harry M. Saragovitz,*
Edward J. Kelly,
Harold Beil & S. Dubroff ATTORNEYS:

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3,270,618

CONTROLLED RECOIL WEAPON

Albert M. Stott, Southampton, Pa., assignor to the United States of America as represented by the Secretary of the Army

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4 Claims. (Cl. 89-43)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to controlled recoil weapons and more particularly to a controlled recoil weapon which is suitable for use on aircraft such as helicopters.

Conventional or recoilless weapons heretofore available are not suitable for use on aircraft for the reason that their firing involves a forward and/or rearward blast of hot gas producing considerable noise and localized high pressure forces upon the craft. The present invention avoids this difficulty by the provision of a recoil and counter recoil energy absorbing means which functions to maintain the hot gas within the weapon and to materially reduce the noise otherwise produced by the firing of the weapon. A distinguishing feature of such energy absorbing means is the use of a section of the weapon barrel as a piston to compress a fluid such as oil which is inclosed in a fixed housing wrapped around the barrel. As will appear, this housing may assume different forms, one of them being hereinafter designated as a single acting buffer type and another as a double acting buffer type. In either case, the housing has outlet orifices or nozzles which may be associated with suitable metering means.

The invention will be better understood from the following description when considered in connection with the accompanying drawings and its scope is indicated by the appended claims.

Referring to the drawings:

FIG. 1 is a sectional view of the controlled recoil weapon as provided with an energy absorbing fluid housing of the single acting buffer type.

FIGS. 2 and 3 illustrate an arrangement for metering the outlets of the housing of FIG. 1,

FIG. 4 illustrates a housing of the double acting buffer type,

FIG. 5 is a section taken on the line 5-5 of FIG. 4, and
FIG. 6 is a section taken on the line 6-6 of FIG. 4,

FIGS. 7 and 8 relate to a metering arrangement for the double acting buffer type housing of FIG. 4.

As indicated by FIG. 1, the controlled recoil weapon of the present invention includes a barrel 10 which has at its muzzle end a shoulder 11 and at its breech end a closure 12 bearing an ignition element 13. Extending between the closure 12 and a projectile supporting member 14 is a projectile positioning and locking means or shot start device 15. The member 14 is adapted to support a projectile 16 and forms a part of a projectile carrier, shown generally at 14A. The carrier 14A also includes a ring 17 secured to member 14 and a housing 18. The housing 18 incloses a buffer fluid 19, is movable with respect to the member 14 and the ring 17, and has at its forward end an inwardly extending flange 22 containing an appropriate sealing O-ring which engages member 14. The ring 17 has a plurality of orifices 20 and functions as an outwardly extending flange. The member 14 has at its forward end a plurality of outwardly extending annular fins 21 defining a forwardmost stop position for housing 18 relative to member 14.

The rearward portion of barrel 10 is supported by a housing 23 which is fixed in position to an aircraft or the like (not shown) by clamps 24 and 25. Such support of

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the barrel within the housing 23 is effected by a sealing ring 26 which forms an outwardly extending flange threadedly fixed to the barrel 10 and an inwardly extending sealing flange 27 of the housing 23 engaging the rear-most peripheral surface of barrel 10. The flange 27 has a plurality of nozzles or orifices 28. It is to be understood that the orifices 20 and 28 are closed respectively by blowout disks 29 and 30, and the sealing rings are provided at certain junctions of relatively movable parts of the weapon to obviate fluid leakage.

The operation of the weapon is explained on the assumption that the various parts are in their illustrated positions and a propellant 31 is in the firing chamber formed between the closure 12 and the projectile supporting member 14. Preferably, the weapon is fired electrically, although mechanical or gas firing ignition devices may be employed.

When the ignition element 13 is fired, an igniter charge (not shown) fires the propellant 31. The pressure generated by the burning of the propellant fractures the locking member 15. Thereupon, the piston-like projectile carrier 14A is forced to travel and to launch the projectile from the muzzle of the barrel 10. At the muzzle, the fins 21 engage the shoulder 11 and are shorn off, absorbing a part of the energy stored in the moving carrier. The remainder of this energy is absorbed when the energy converting buffer fluid 19 flows through orifices 20. During this cycle of operation, the transmission of undesirable reaction forces upon closure 12, barrel 10 and sealing ring 26 to the frame of the aircraft through clamps 24, 25 is prevented by the action of a recoil absorber which dissipates kinetic energy of the recoiling parts by conversion to kinetic energy of the recoil fluid 32 when fluid 32 is expelled through orifices 28 from the annular fluid chamber defined by the longitudinally spaced flanges 26, 27. It will be noted that a snap ring 33 limits forward movement of the barrel 10 with respect to the housing 23.

Additional control of dissipation of undesirable reaction forces may be accomplished by variable metering of nozzles 28. This may be effected in various ways, one of which is the variable cross-section grooves 34 of FIGS. 2 and 3. These grooves may be of constant width and variable depth and begin and end at predetermined distances from the ends of the housing 23.

As previously indicated, the recoil absorber may be either of single acting buffer type illustrated by FIGS. 1 to 3 or a double acting buffer type. In the case of the single acting type, the barrel 10 is permitted to counter-recoil unrestrained when the projectile carrier strikes the stop shoulder 11, the recoil fluid having previously been projected rearwardly through the orifices 28. The size of the nozzle, the volume of the recoil fluid and the area of ring 26 are determined by matching the desired buffering or reaction requirements.

The double acting buffer type illustrated by FIGS. 4 to 6 differs from the single acting type of FIGS. 1 to 3 in that the housing 23 has an inwardly extending flange 35 at its forward end and the intermediate ring 26 on the barrel 10 has nozzles 36 (and corresponding blow-out disks) which are angularly offset from the orifices 28 as indicated by FIGS. 5 and 6. Under these conditions, the counter-recoil energy or forward movement of ring 26 is absorbed by the cushioning effect of that portion of the fluid having passed through the orifices 36 during the recoil phase.

With the exception of a metering rod 37 spacedly anchored in flange 27, FIG. 7 is a section taken on the line 7-7 of FIG. 6. The metering rod 37 performs the same function as the grooves 34 of FIGS. 2 and 3, its central section being constricted to provide a similar variable metering of the recoil fluid as heretofore described. It is to be understood that a metering rod 37 extends through each orifice 36 of FIG. 6.

Various modifications, alterations or changes may be resorted to without departing from the scope of the invention as defined in the appended claims.

I claim:

1. In a weapon having a slidable carrier therein for supporting a projectile, 5
a barrel supporting said carrier and having at its muzzle end a shoulder for stripping said carrier from said projectile and ignition means at its breech end, said carrier comprising a movable housing and a projectile supporting member having an outwardly extending flange engaging said housing, said housing having inwardly extending flange means engaging said member and longitudinally spaced from said flange to define a chamber between said housing and member, one of said flange and flange means having orifice means extending therethrough and normally closed by blow-out disk means and buffer fluid in said chamber for dissipating energy in the moving carrier when said carrier strikes said shoulder at the end of its travel.
2. In a controlled recoil weapon having a slidable carrier therein for supporting a projectile, 10
a barrel having at its muzzle end a shoulder for stripping said carrier from said projectile and at its breech end a closure bearing an ignition element, said closure being spaced from said carrier to form a chamber for containing a propellant, 15
fracturable means positioning said carrier in said barrel and locking it thereto, 20
a fixed housing supporting said barrel and having flange means fixed to and extending inwardly from said housing, and engaging said barrel, 25
a flange spaced substantially forward of said flange means and extending outwardly from said barrel and engaging said housing one of said flange and flange means having orifice means normally closed by a 30

- blow-out disk, said spaced flange and flange means defining an inclosure between said housing and said barrel, and
a recoil absorbing fluid in said inclosure, 35
said carrier having at its forward end radial fin means for engaging said shoulder to buffer the impact of said carrier on said shoulder.
3. A controlled recoil weapon according to claim 2 wherein said carrier includes an independently movable housing and a projectile supporting member having an outwardly extending flange, said member flange engaging said carrier housing and having an orifice extending there-through and normally closed by a blow-out disk, said carrier housing having inwardly extending flange means engaging said member, said carrier flange and flange means being longitudinally spaced apart and defining a chamber between said carrier housing and member, and a buffer fluid in said chamber.
4. A controlled recoil weapon according to claim 2 wherein the interior of said fixed housing is grooved to provide variable metering of said orifice.

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BENJAMIN A. BORCHELT, *Primary Examiner.*

35 FRED C. MATTERN, JR., *Examiner.*

S. W. ENGLE, *Assistant Examiner.*