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London WC2A 3LS(GB)(54) **Gas-powered repeating weapons.**

(57) The present invention relates to a device for repeated discharge of gas-pressured projectiles, comprising a barrel and a magazine adapted for the coaxial loading of projectiles into the barrel, the region between barrel and magazine defining a space communicating with the barrel and through which gas can be introduced to forcibly eject a projectile from the barrel, characterised in that the communication of the space with the barrel is via a plurality of apertures opening into the region between barrel and magazine, at least one, but not all, of which apertures also extends longitudinally into the bore of the barrel thereby to create, on actuation and in addition to the force to eject the projectile, an imbalance in the reverse force to bias the next projectile in the magazine against the wall thereof, which device selectively discharges shots one at a time, while ensuring that the remainder stay in the magazine.

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Gas-Powered Repeating Weapons

The present invention relates to a device for repeated discharge of gas-pressured projectiles, comprising a barrel and a magazine adapted for the coaxial loading of projectiles into the barrel, the region between barrel and magazine defining a space communicating with the barrel and through which gas can be introduced to forcibly eject a projectile from the barrel.

Tube shaped magazines for repeating and automatic target shooting weapons are known, the axes of which are either perpendicular, parallel or coaxial with the barrel of the weapon.

Known constructions are not designed for specially shaped shots, generally made of soft materials, and do not provide for accurate and effective shooting. One problem is the deformation of shots caused by their mutual impact after the pressure medium has entered the magazine. Another is unsuitable force of the feeder and carrier of shots to shots situated in the magazin.

In a known type of tube magazine with an axis perpendicular to the barrel axis, shots fed to the front of the entering cone of the barrel are transferred by a spring-loaded feeder, but deformation still occurs. The arrangement is of complicated construction and is only suitable for hard spherical shots.

Another feeding device with a tubular magazine arranged above the barrel axis is equally complicated and unreliable. A carrier, by means of lateral movement, removes the shot and transfers it into the barrel. However, deformation of the shot and unreliable operation can still occur.

In one known arrangement, a linear tube magazine is lined up coaxially with the barrel of the weapon, forming a unit therewith. An entry cone with its top pointing into the barrel is arranged between the rear face of the barrel and the face of the magazine, and shots are forced into the entry cone from the storage magazine by a spring loaded feeder. A channel for conveying the pressure medium leads to the space of the entry cone. The pressure medium enters after a shot has been released into the magazine to distribute the shots so that each shot is forced out of the barrel, while the other shots remain in the magazine. This arrangement is unreliable and has a substantial failure rate, as the changing pressure of the pressure medium does not ensure a specific position of the shot, so a shot may enter deeply into the barrel, partly followed by another. After shooting both shots, all remaining shots in the magazine may be forced out of the barrel.

In another known embodiment, a storage device for a multishot gas weapon for soft material

shots with a tubular magazine coaxial with the barrel of the weapon and with a needle feeder has a special arrangement of the rear barrel face and the front end of the magazine (Czechoslovak certificate of authorship of invention No. 197.658). Specifically, between the face of the magazine and the rear face of the barrel, a conical slot with the apex toward the magazine is provided. A channel for supply of pressure medium leads into the space of said slot. An entry cone with the apex pointing into the bore of the barrel is provided at the rear face of the barrel, serving for fixing and rectifying the track of the shot to the axis of the barrel. When the trigger is actuated, the pressure medium enters through the supply channel into the conical slot between magazine and barrel, forces the shot out of the barrel, and causes the remaining shots to remain in the magazine at the moment the shot is fired. Rearward movement of the shots in the magazine is prevented by a spring loaded needle feeder with a reverse pawl. After each shot, the pressure is equalized, and the needle feeder shifts another shot into the entry cone at the rear face of the barrel. A shot is also engaged thereby into the conical slot, readying the weapon for the next shot.

Calibrated spherical shots can be used for this weapon, particularly the presently used Diabolo (Trade Mark) shots. An advantage of this embodiment of the magazine lies in its simplicity of manufacture and that it is coaxial, the symmetrical arrangement preventing irregular deformation of the shots.

A drawback of this arrangement is the increased sensitivity of the dosing of shots to the accuracy of calibration of the barrel of the weapon, to parameters of the spring loaded needle feeder and to variations of the stiffness of the spring. When these parameters are changed, even more shots can be forced irregularly out of the barrel.

Thus, the present invention provides, in a first aspect, a device for repeated discharge of gas-pressured projectiles, comprising a barrel and a magazine adapted for the coaxial loading of projectiles into the barrel, the region between barrel and magazine defining a space communicating with the barrel and through which gas can be introduced to forcibly eject a projectile from the barrel, characterised in that the communication of the space with the barrel is via a plurality of apertures opening into the region between barrel and magazine, at least one, but not all, of which apertures also extends longitudinally into the bore of the barrel thereby to create, on actuation and in addition to the force to eject the projectile, an imbalance in the reverse force to bias the next projectile in the magazine

against the wall thereof.

The preferred number of extended apertures, or slots, is one, with a total of about 4 slots, although a pair of diametrically opposed slots, one short and one extended, can suffice, for example. These slots will generally be created in a cylindrical portion of the barrel extending back from the bore to engage the magazine. This cylindrical portion is not preferably the full width of the barrel, so that the space between barrel and magazine is provided around it.

It is also preferred that the rear of the barrel is substantially conical and is matched by a corresponding inverse cone in the end of the magazine, the space between them thereby being a conical slot with its apex toward the magazine.

In addition, in a preferred embodiment, the connection to the gas supply is via a, particularly bevelled, slot in one wall of the magazine leading directly to the extended slot, thereby assisting directly in the creation of the imbalance in the force.

The retardation of shots in the magazine may be further enhanced by having the bore of the magazine, at least at the discharge end, being of greater diameter than the bore of the barrel. The imbalance of the force thereby pushes the next shot against the wall of the bore, and the difference in diameters provides an additional barrier to the shot.

This latter effect may be further enhanced by a slight tilt of the entry to the bore of the barrel away from the extended slot.

In an alternative aspect, the above drawbacks are also eliminated by a storage device according to the present invention, the main feature of which is in the creation of a blow-through slot between the terminations of a tube shaped magazine and of the barrel of the weapon, whereby longitudinal slots are created in the cylindrical off set end of the barrel, into which the channel for supply of the pressure medium terminates, one of the longitudinal slots being prolonged up to the barrel, a bevelled slot being provided in the wall of the tubular magazine and engaging into the conical blow-through slot. The pressure medium, supplied by way of a channel into the blow-through slot forces, on actuation, a shot resting against the rear face of the barrel out of the barrel of the weapon and, by the dynamic effect in the opposite direction, prevents further shots situated in the tube shaped magazine following the first shot into the barrel of the weapon. Due to the unequal length of slots in the cylindrical off-set part of the barrel, a force in a non-axial direction is created, causing a blocking of the shots in the magazine which has a larger diameter than the largest diameter of the shots, so that they are arranged in the magazine with a certain tolerance. After the pressure in the barrel, in

the blow-through slot and in the channel for the pressure medium are equalized, the shots are again axially lined up and the spring loaded feeder shifts the column of shots forward toward the rear face of the barrel of the weapon.

The present invention thus provides for the transfer of shots from the magazine to the barrel of the weapon with reliability and allows trouble-free shooting.

The present invention will now be further illustrated with reference to the accompanying drawings of a preferred embodiment, in which:

Figure 1 shows a cross-section of the relevant part of the weapon, with (i) showing the whole section, and (ii) the end of the barrel only; and

Figure 2 is a view on B-B of Fig. 1.

The gas weapon has within the sleeve of its breech 1 a tube shaped magazine 2 situated coaxially with a firmly anchored barrel 3 of the gas weapon. The barrel 3 has, at its rear end, a cone 4 with a cylindrical stepped end of the barrel 5, wherein slots 6, 6a are provided. A blow-through slot 8 is created between the conical end 4 of the barrel 3 and an equidistant conical end 7 of the magazine 2, said blow-through slot 8 determined by the length of the cylindrical stepped end 5 of the barrel 3. The slot 6a in the cylindrical stepped end 5 of the barrel 3 is elongated and engages up to the bore of the barrel 3. A bevelled slot 9 linking with the prolonged slot 6a is arranged in the conical end 7 of the magazine 2. A supply channel 10 for the pressure medium terminates into the space of the bevelled slot 9. The target shots 11 are situated in line in the tube shaped magazine 2 and are forced into the bore of the barrel 3 by a spring loaded needle feeder 12.

By activating a trigger mechanism, (not shown) a dose of the pressure medium is released. This medium enters by way of the channel 10 into the conical blow-through slot 8 and between the shots within the magazine 2. A shot 11 resting against the rear face of the barrel 3 is forced out of the barrel 3 after overcoming the extrusion resistance. The remaining shots 11 are maintained in the magazine 2 behind the conical blow-through slot 8 by the dynamic action of the pressure medium in the reverse direction which, due to the unequal lengths of slots 6, 6a in the cylindrical stepped end of the barrel 3, generates a force in an inclined direction and causes a blocking of missiles 11 in the magazine 2. After the pressure in the barrel 3, blow-through slot 8 and supply channel 10 has equalised, the shots 11 are again axially lined up and the spring loaded needle feeder 12 shifts the column of shots 11 forward toward the rear face of the barrel 3 of the weapon, whereafter the weapon is again prepared for shooting.

An accurate dosing of shots is thus secured by the dynamic action of the forces generated in a bypass space created by the elongated slot 6a, the conical slot 8, the bevelled slot 9 and the supply channel 10 of the gas weapon.

Claims

1. A device for repeated discharge of gas-pressured projectiles, comprising a barrel and a magazine adapted for the coaxial loading of projectiles into the barrel, the region between barrel and magazine defining a space communicating with the barrel and through which gas can be introduced to forcibly eject a projectile from the barrel, characterised in that the communication of the space with the barrel is via a plurality of apertures, preferably 4, opening into the region between barrel and magazine, at least and preferably one, but not all, of which apertures also extends longitudinally into the bore of the barrel thereby to create, on actuation and in addition to the force to eject the projectile, an imbalance in the reverse force to bias the next projectile in the magazine against the wall thereof.

2. A device according to claim 1, wherein the apertures are provided in a cylindrical portion of the barrel of a lesser diameter than the barrel, extending back from the bore and engaging the magazine, the space between barrel and magazine being created thereby.

3. A device according to claim 1 or 2, wherein the rear of the barrel is substantially conical and corresponds to an inverse cone in the end of the magazine, the space being between them.

4. A device according to claim 1 or 2, wherein connection to the gas supply is via a, preferably bevelled, slot in the wall of the magazine leading directly to the extended slot.

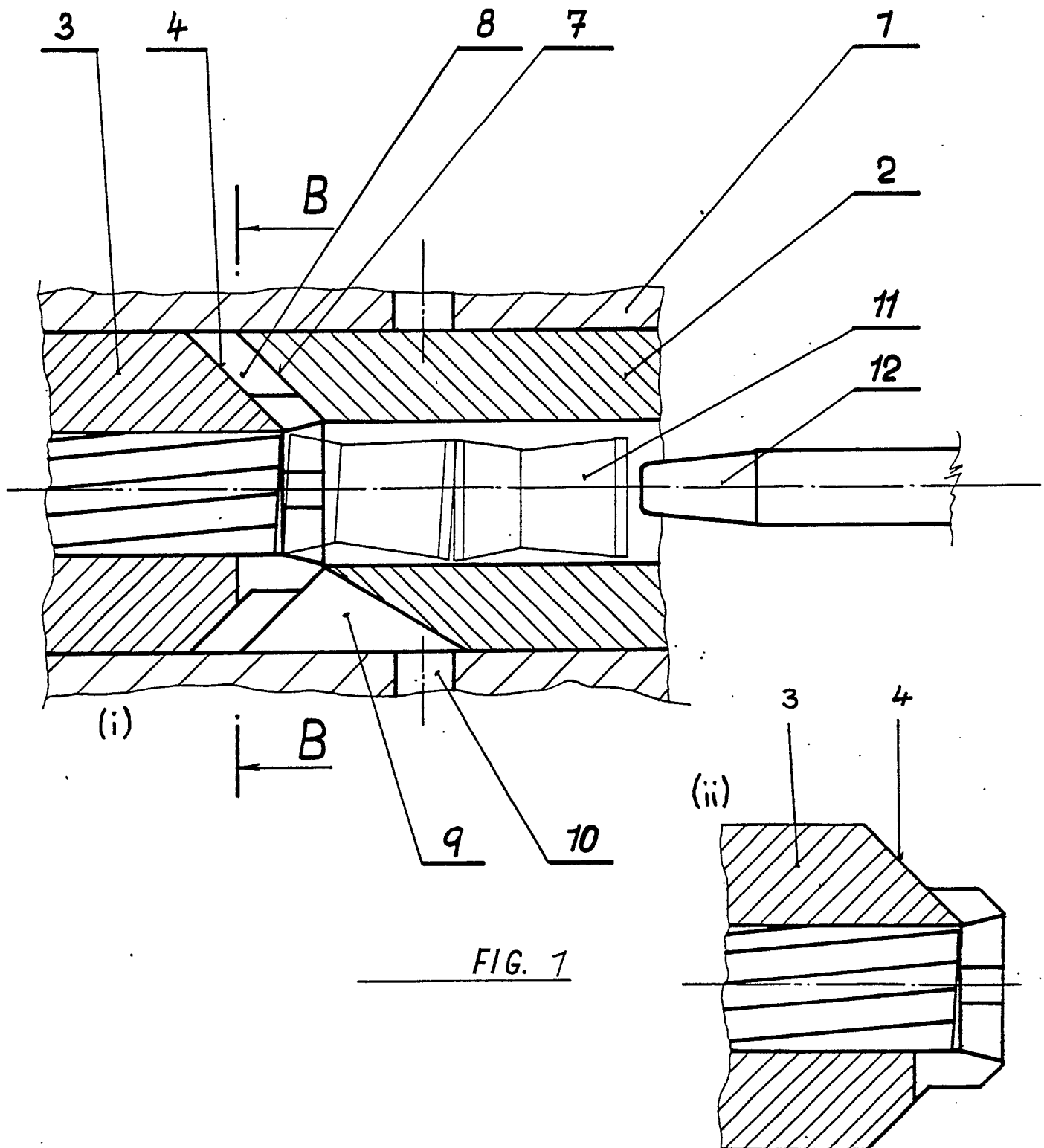
5. A device according to any preceding claim, wherein the bore of the magazine, at least at the discharge end, is of greater diameter than the bore of the barrel.

6. A device according to any preceding claim, comprising a slight tilt of the entry to the bore of the barrel away from the extended slot.

7. A storage and feeding device for a multishot, automatic repeating gas weapon with a supply of a pressure medium into a space between the barrel of the weapon and a coaxial tube shaped magazine of shaped target shots, characterised in that a blow-through slot (8) is provided between a conical end (4) of the barrel (3) and a conical end (7) of the magazine (2), the conical end of the barrel having a stepped end (5) comprising at least one longitudinal slot (6) and one longitudinal prolonged slot (6a) engaging up to the bore of the barrel (3), arranged therein, a bevelled slot (9) arranged on the external

side of the body of the magazine (2) connected at the place of the prolonged slot (6a) and terminating into the supply channel (10) of the pressure medium,

the device optionally further comprising any one or more, in any combination, features as defined in any preceding claim.



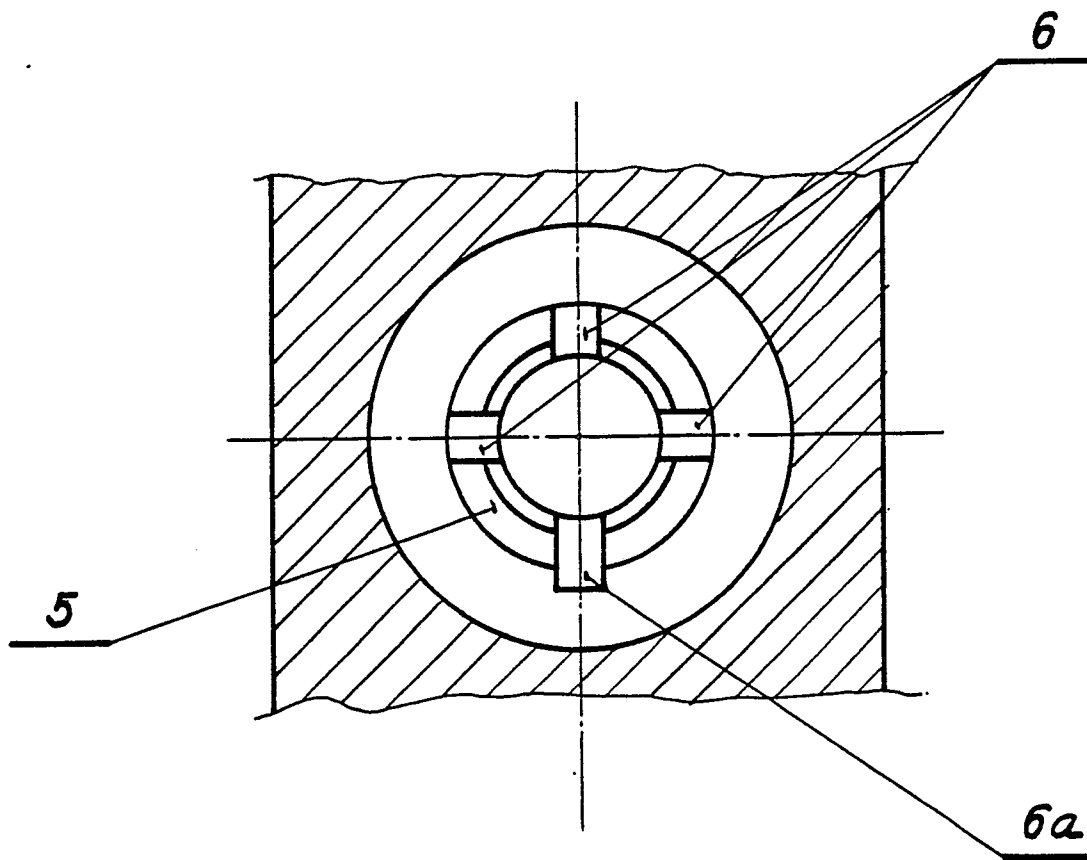


FIG. 2