



(11)

EP 3 789 724 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.03.2021 Bulletin 2021/10

(51) Int Cl.:
F42B 6/10 (2006.01) **F41B 11/62** (2013.01)
F41J 9/02 (2006.01) **F41J 9/08** (2006.01)

(21) Application number: **20191617.8**

(22) Date of filing: **18.08.2020**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **Holmud, Dennis**
2860 Søborg (DK)
• **Thuesen, Jacob**
3050 Humlebæk (DK)

(74) Representative: **Heiden, Finn**
Heiden ApS
Sønderengen 12
2870 Dyssegård (DK)

(71) Applicant: **B4hunt ApS**
2610 Rødovre Copenhagen (DK)

(54) **TRAINING CARTRIDGE FOR A SHOTGUN**

(57) Training cartridge (1) for a shotgun (47), comprising an outer hollow casing (2) closed at its opposite ends (3,4) by front and a rear parts (5, 6), respectively.

A concentrically arranged, inner barrel tube (7) is for accommodating at least two pellets (Pf, P, Pr) before shooting. A compartment (9) for accommodating pressurized gas is defined between the inside (10) of the outer hollow casing (2), the insides (11, 12) of the front and rear parts (5, 6) and the outside (13) of the barrel tube (7). With the inventive solution, a pellet loading opening (16) is arranged at the stern surface (17) of the rear part (6), and at least one gas flow channel (18;19) with a valve (20;21) is arranged extending through the side of the barrel tube (7) at an axial position of more than 11/2 barrel diameter from the pellet loading opening (16). The valve (20;21) has a movable part (22;23) extending into the barrel (8). The at least two pellets (Pf, P, Pr) are introduced into the barrel through the central loading opening (16) until the most rear pellet (Pr) is flush with the stern surface (17) of the rear part (6). The at least one rear pellet (P, Pr) then closes off the barrel (8). No other closure means are arranged at the rear part (6). When shooting, the firing pin (52) hammers directly at the most rear pellet (Pr) causing all the pellets (Pf, P, Pr) to move forward through the barrel (8). The front pellet engages immediately with the movable part (22;23) of the valve (20; 21), and causes it to open the valve for gas inlet. The gas rapidly flows in between the front pellet (Pf) and the succeeding rear pellet (P), so that the front pellet (Pf) is shoot out of the barrel (8). The pellets are typically plastic pellets weighing 0,12-0,5 grams. The pellet trajectory is kept as short as typically 4-6 meters. The inventive training cartridge is then highly reliable and safe for the shoot-

er or rifleman to exercise with outside the official shooting premises. For the animal hunter it is a great advantage, that shooting with his own shotgun at his home premises can be exercised, so that building up muscle memory with his own weapon before going out in the nature is achieved.

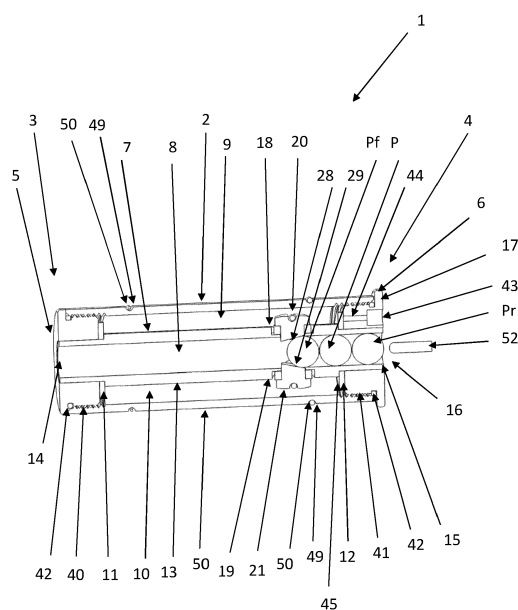


Fig. 3

Description

[0001] The present invention concerns the field of cartridges for shotguns as well as use of such cartridges for training purposes.

[0002] The inventive apparatus is a training cartridge for a shotgun, comprising an outer hollow casing closed at its opposite ends by a front part and a rear part, respectively, and a concentrically arranged, inner barrel tube for accommodating at least two pellets before shooting, a compartment for accommodating pressurized gas defined between the inside of the outer hollow casing, the insides of the front and the rear parts and the outside of the barrel tube, and that the barrel of the barrel tube extends out through a discharge opening at the front part for launching the front pellet of the at least two pellets when shooting.

[0003] Such cartridges are for example known from use with paint ball shotguns or from toy guns. The toy guns are adapted to shoot several pellets at a time. The pellets mostly used are ball-shaped having diameters of 4,5 mm or 6 mm. They are made of plastic having weight from 0,12 gram up to 0,48 gram, or may even be made of aluminium, lead, steel, cobber, or glass weighing up to 2 grams.

[0004] However, these toy gun cartridges are not applicable when the shooter is to exercise his abilities of hitting the targets with genuine shotguns, such as his own shotgun. For the shooters there are no alternatives other than to go to some official training facilities and exercise shooting ability with the normal bullet cartridges i.e. gunpowder charged cartridges. This applies whether the shooter is an official shooter such as a policeman or a military person or is a private hunter.

[0005] The term shotguns encompass all types of firearms, such as break action weapons and rifles, guns and rifles with side draw as well as pistols and revolvers.

[0006] The purpose of the present invention is to provide a training cartridge, which is safe to use with the shooter's own shotgun outside the official training fields.

[0007] The inventive solution is characterised in, that the barrel of the barrel tube at its opposite end extends to a pellet loading opening at the stern surface of the rear part, that at least one gas flow channel with a valve is arranged extending through the side of the barrel tube at an axial position of more than 11/2 barrel diameter from the pellet loading opening, and that the valve has a movable part extending into the barrel.

[0008] The barrel is then adapted to accommodate at least two pellets before shooting. The at least two pellets are introduced into the barrel through the central loading opening until the most rear pellet is flush with the stern surface of the rear part. The at least one rear pellet then closes off the barrel. No other closure means are arranged at the rear part.

[0009] Before shooting, the gas compartment of the cartridge is filled with gas such as the readily available mixture of butane and propane. A certain constant pres-

sure of between 7 bar and 15 bar is established. This satisfies a trajectory length of 4-6 meters when plastic pellets weighing between 0,12 gram and 0,5 gram are applied. However, other types of gas, pressure levels and types of pellets may of course be applied without departing from the basic inventive solution.

[0010] When shooting, the firing pin hammers directly at the most rear pellet causing all the pellets to move forward through the barrel. The front pellet engages immediately with the movable part of the valve at an axial position of more than 1 1/2-barrel diameter from the pellet loading opening, and causes it to open the valve for gas inlet. During further axial movement of the pellet, the gas rapidly flows in between the front pellet and the succeeding rear pellet.

[0011] The at least one rear pellet both provides a closure against gas outlet from the barrel at the pellet loading hole and is simultaneously halted against the firing pin. Then, the gas pressure rapidly builds up between the front pellet and the succeeding pellet. The counterpressure against the front pellet causes it to be shoot out of the barrel.

[0012] When the front pellet during its axial acceleration moved out of engagement with the movable part of the valve, the valve returned to its closed position, so that gas-flow into the barrel is halted. As the firing pin hammers towards the pellets with the same force each time a shoot is made, the front pellet passes and influences the valve to open for the exact same time-period. The same amount of gas is then released into the barrel and consequently is the front pellet exposed with the same pressure and velocity each time a shoot is released.

[0013] The gas pressure in the gas compartment is regulated to a safe level for the particular pellets applied. A down-scaling of the genuine bullet weight and trajectory applied with normal gunpowder charged cartridges in a shotgun, is accomplished by choosing a low gas pressure for the particular pellet size and weight applied. The aim is to keep the pellet trajectory as short as for example 4-6 meters. This is accomplished by applying a pressure of 5-15 bar in the gas compartment and shooting with plastic pellets having weight from 0,12 gram to 0,48 gram.

[0014] The inventive training cartridge is then highly reliable for the shooter or rifleman to exercise with. He is completely confident that the pellet performs the exact same curve at each shoot, however without any risk of killing anybody as with the genuine bullet cartridges.

[0015] During the shooting, the succeeding rear pellet remains in the barrel and ends up as the next front pellet when a new rear pellet has been introduced through the pellet loading opening at the stern surface of the rear part. The cartridge is then ready for the next shoot. This is especially an advantage when applying a break action weapon as the cartridge can remain in the weapon when the new pellet is inserted into the cartridge.

[0016] Hereby is obtained a training cartridge, that can be used in a shooters genuine weapon for exercising

shooting ability without the necessity of training at an official shooting field. If the shooter is an animal hunter, he may exercise the shooting at places in his home, such as the garage, the garden or a cellar. He is therefore a much more skilled hunter when he is out in the nature. The risk of wounding the animals instead of killing them is then reduced severely.

[0017] When at least two gas flow channels with a valve are arranged at the same axial position of the barrel tube, and the two openings with valves being opposite each other or the three or more openings with valves being evenly distributed around the periphery of the barrel tube, the front pellet then engages simultaneously with the movable parts of the valves and causes them to open the valves at the same time. During further axial movement of the pellet, the gas rapidly flows in between the front pellet and the succeeding rear pellet simultaneously from opposite sides, or simultaneously from the openings evenly distributed around the periphery.

[0018] The pressure forces of simultaneous engagements with the valves, as well as forces of in-flowing gas from the two or more than three directions exerted on the pellet then outbalance each other. The pellet is then free from any rotation when it leaves the barrel.

[0019] The resulting effect is a remarkably reliable repetition accuracy of each geometrical curve performed by the pellets during repetitive shooting.

[0020] When the movable part of the valve extending into the barrel is a rod extending radially through the gas flow channel with its inner end into the barrel tube, and the inner end of the rod has an inclined end surface facing towards the rear closure part, then the front pellet engages with the inclined surface of the radially movable rod. During axial movement of the pellet, part of its periphery slides rapidly over the inclined surface thereby forcing the rod radially outwards. The valve opens and the gas flows rapidly in between the front pellet and the succeeding rear pellet.

[0021] The inventive embodiment is a constructive simple solution, easy to make and having a few parts only, however it is very effective for providing a fast and reliable engagement of the pellet with the valve.

[0022] The angle between the inclined end surface and the axial extension of the barrel is advantageously between 10° and 40° so that the part of the periphery of the pellet engaging the valve slides easily with low friction over the inclined surface having an inclined angle of between 10° and 40°. Simultaneously, the rod is moved radially. The radially moved distance may advantageously be altered when altering the angle or when altering the distance that the rod extends into the barrel. The radially moved distance determines the opening period for gas inlet and consequently the gas amount introduced.

[0023] A smaller inclined angle of for example 20° as well as a smaller radially moved distance of for example 1,0 mm introduces a smaller amount of gas than a greater angle of for example 35° and a greater radially moved

distance of 2,0 mm does.

[0024] So by regulating the angle of the inclined surface and or the radially moved distance, the introduced amount of gas is regulated accordingly. As gas inlet amount determines the curve and length of it performed by the pellet shoot out, this is regulated in a very simple manner as well with the size of the inclined angle and or length of radially moved distance of the rod.

[0025] When the valve is a seat valve of which the rod pin has a diameter enlarged seating part at the outer end adapted to engage with a seat arranged at the outside of the barrel tube in the gas compartment, then the valve is especially simple to install at the gas flow channel of the barrel tube. It is reliable and has an effective function. The opening period of the valve is advantageously altered just by replacing the rod pin with another rod pin having a different configuration at its inner end adapted to be in engagement with the pellets.

[0026] Resilient spring means may advantageously be arranged adapted to maintain radially inwardly directed spring force against the enlarged seating part in the open position thereof. The resilient spring means returns the enlarged seating part to the closed position in its seat when the pellet has travelled past the valve. Thereafter the resilient spring means maintains safe closure of the valve.

[0027] When the resilient spring means is a rubber O-ring arranged around the outer periphery of the barrel tube and of the enlarged seating part, then the O-ring is simple and fast to mount around the barrel tube and the enlarged seating part of the valve. The spring force can be altered easily just by changing the O-ring with another one having a thicker or thinner cross-section.

When a groove is made in the top of the enlarged seating part, the O-ring is advantageously arranged in the groove with part of its peripheral extension. The enlarged seating part is then maintained with the groove perpendicular to axial extension of the barrel. Consequently, the rod pin and its inner end in the barrel is maintained in the same angular position. The pellets then engage with the same configuration of the inner end of the rod each time a shoot is made.

[0028] A gas refill opening is advantageously arranged in the rear closure part, which via a channel through the rear closure part is connected to the gas compartment, and which channel at the inside opening is closed by a further valve means. It is especially expedient to refill gas from the rear of the cartridge. When used in a break action weapon for example, the cartridge simply remains in the weapon during refill of the gas compartment. The shooter is then able to resume the shooting in a noticeably short period of time.

[0029] As the inner diameter of the barrel tube is adapted to be 0,015-0,02 mm greater than the diameter of a particular standard plastic pellet to be applied in the training cartridge, then the sealing of the pellets in the barrel against the gas is especially satisfactory and simultaneously the friction of the pellets with the barrel inside is

diminishing.

[0030] When the inner diameter of the barrel tube is between 6,000 mm and 6,015 mm and the plastic pellets are standard plastic pellets having a diameter of 5,950 mm $\pm 0,010$ mm the cartridge is especially safe to exercise shooting with at home premises. The gas pressure could be regulated to 9 bar, so that the plastic pellets perform a trajectory length of 5-7 meters.

[0031] The length of the barrel is advantageously adapted to accommodate two or three or four pellets before shooting releases the front pellet.

When the length of the barrel is adapted to accommodate more than two pellets, the surplus number of pellets remaining in the barrel when the front pellet is shoot out, provide even further tightness of the barrel against gas outlet at the rear part.

[0032] When the inventive training cartridge for a shotgun is used in a break action weapon, the cartridge simply remains in the weapon between each shoot. The break weapon is opened and without taking out the cartridge a new pellet is loaded fast and easy into the pellet loading opening at the stern surface of the rear part. The weapon is ready for the next shoot without the necessity of removing or reinserting the cartridge.

[0033] The inventive training cartridge may be applied in rifles and pistols as well.

[0034] When the inventive cartridge is used in the shooter's personal shotgun and a pressure of for example 5-15 bar is applied in the gas compartment during shooting with plastic pellets having weight from 0,12 gram to 0,48 gram it is especially advantageous.

[0035] By the method of using the inventive training cartridge in his own weapon, the shooter is performing the steps of:

- placing the cartridge in shooters shotgun,
- loading gas into gas compartment of cartridge ,
- loading plastic pellets into cartridge,
- arranging a target in a distance of 4-6 m from shooter, and
- shooting a pellet one at a time against the target with intermittent loading of a pellet into the loading opening at the stern surface of the training cartridge.

[0036] Furthermore, when training at a moving object further performing the step of moving the target with a speed of 4 - 8 km/h.

[0037] The shooter is then able to exercise his ability to hit the target when using his own weapon at places not requiring weapon allowance or at official training facilities. This is a great advantage for him as he then builds up the muscle memory when using his own shotgun. He may exercise the shooting at places in his home, such as the garage, the garden, or the cellar.

[0038] The invention is explained further below by reference to preferred embodiments as well as the drawing, in which

fig. 1 discloses schematically in perspective a training cartridge according to the invention, seen from the rear end,

fig. 2 schematically, in perspective, the training cartridge being inserted into a break weapon shotgun, seen in open position,

fig. 3 schematically the training cartridge of figures 1, seen in axial section, adapted for having three pellets inserted in the barrel and being ready for shooting,

fig. 4a schematically part of the training cartridge of figure 1 and 3, seen in enlarged axial section, disclosing the rear end of the barrel, the valves, and the pellets,

fig. 4b another embodiment of fig. 4a, seen in enlarged axial section, disclosing the rear end of the barrel, the valves, and the pellets,

fig. 5 the training cartridge of fig. 3 and 4a during shooting as the firing pin is hammering at the rear pellet,

fig. 6 the training cartridge of figures 3, 4a and 5 as the front pellet has been shoot out of the barrel and the firing pin retracts,

fig. 7 schematically, in perspective, the break weapon shotgun of figure 2, seen in open position as a new pellet is inserted to the cartridge before next shoot,

fig. 8 the same break weapon shotgun of figures 2 and 7, seen in open position as gas is refilled to the cartridge,

fig. 9 schematically and in axial section another embodiment of the training cartridge adapted for having two pellets in the barrel when shooting,

fig. 10 schematically, and in axial section a further embodiment of the training cartridge adapted for having four pellets in the barrel when shooting, and

fig. 11 schematically, and from above the downsizing of the traditional shooting field to suit training with the inventive cartridge.

[0039] The inventive training cartridge 1 disclosed in figure 1 comprises an outer hollow casing 2 closed at its opposite ends 3, 4, by a front part 5 and a rear part 6, respectively. A concentrically arranged, inner barrel tube 7 has a barrel 8 adapted for accommodating at least two pellets P before shooting.

[0040] As further disclosed in figure 3, a compartment

9 for accommodating pressurized gas is defined between the inside 10 of the outer hollow casing 2, the insides 11, 12 of the front and the rear parts 3, 4 and the outside 13 of the barrel tube 7.

[0041] The barrel 8 of the barrel tube 7 extends out through a discharge opening 14 at the front part 3 for launching the front pellet Pf of the pellets when shooting. At the opposite end 15 of the barrel tube 7 it extends to a pellet loading opening 16 at the stern surface 17 of the rear part 6.

[0042] Two gas flow channels 18, 19, each with a valve 20, 21, are arranged extending through the side 13 of the barrel tube 7 opposite each other. According to the inventive solution, they are arranged at the same axial position of more than 1 1/2-barrel diameter from the pellet loading opening 16. The barrel is then adapted to accommodate at least two pellets before shooting.

[0043] At the particular embodiment disclosed in figures 3-6, the length of the barrel 8 is adapted to accommodate precisely three pellets P before shooting. Consequently, the valves 20, 21 are then arranged at an axial distance of more than 2 1/2-barrel diameter from the pellet loading opening 16.

[0044] The build-up and function wise of the valves 20, 21 and the relevant part of the barrel tube 7, at which the valves are arranged, are explained in more detail under reference to figures 4a and 4b.

[0045] Each valve 20, 21 have a movable part 22, 23 extending into the barrel 8.

The movable part 22, 23 of each valve 20, 21, which is extending into the barrel 8 is a rod 24, 25 respectively, extending radially through the particular gas flow channel 18, 19 with its inner end 26, 27 respectively, into the barrel 8, as disclosed in figure 4a.

[0046] The inner ends 26, 27 of the rods 24, 25 each has an inclined end surface 28, 29 respectively facing towards the rear closure part 6. The angle A between the inclined end surfaces 28, 29 and the axial extension of the barrel is 28° at the depicted embodiment.

[0047] The valves 20, 21 are so-called seat valves of which the rod pins 24, 25 have a diameter enlarged seating part 30, 31 respectively, at the outer ends 32, 33 adapted to engage with a seat 34, 35 arranged at the outside 13 of the barrel tube 7 in the gas compartment 9. At each seat 34, 35 is a rubber sheave 36 for sealing of the valves in closed position.

[0048] A rubber O-ring 37 is arranged around the outer periphery of the barrel tube 7 and opposite parts of the O-ring 37 rest in grooves 38, 39 respectively, in each enlarged seating part 30, 31, respectively.

[0049] The front part 5 and the rear part 6 are safely engaged with the front end 3 and the rear end 4 respectively of the hollow casing 2 by threads 40, 41, respectively. As the pressure applied in the gas compartment 9 is between 5 bar and 15 bar the safe engagement is important. O-rings 42 ensure tightness against the gas at the end parts 6, 7.

[0050] The pellets applied at this preferred embodi-

ment are ball-shaped plastic pellets having a weight of 0,25 gram. The diameter of the plastic pellets is as standard 5,950 mm +/- 0,010 mm. The barrel tube 7 is made of stainless steel or high-quality aluminium having a diameter of the barrel 8 of between 6,000 and 6,015 mm. Thereby is achieved a satisfactory gas tightening effect by the rear pellet Pr and the intermediary pellet P. At the same time the friction between the front pellet Pf and the barrel 8 is diminishing during shooting.

[0051] The gas pressure in the compartment 9 is kept constant at 9 bar whereby the front pellet Pr is accelerated to a desired shooting velocity of 70 m/s +/- 2 m/s. The length of the pellet trajectory is then calculated to 5 m, which is especially desirable for training shooting at home premises.

[0052] At the rear closure part 6 is made a gas refill opening 43, which via a channel 44 is connected to the gas compartment 9. A rubber sheave 45 is arranged at the inside 12 of the rear part 6 functioning as a valve means, i.e. fig. 3. Gas is then easily refilled with a standard gas container 47 readily available in the market. This is especially an advantage when the training cartridge 1 is in a break weapon 47 as depicted at figure 8. It is not necessary to remove the cartridge 1 from the weapon 47 during refill of gas, it simply remains in the break weapon 47. When the gas compartment 9 is filled with gas from a standard can 46 having a pressure of 9 bar, then around 40 plastic pellets of 0,25 gram may be shoot out once at a time during training before refilling with gas is necessary.

[0053] Two peripheral grooves 49 are arranged with axial distance at the outside 48 of the hollow casing 2 of the cartridge 1. Each peripheral groove 49 supports a O-ring 50 which facilitates both an optimal fitting and support of the training cartridge 1 when pushed into the barrel 51 of the break weapon 47 as well as an easy release when the cartridge 1 later on is removed again.

[0054] At beginning of a shooting session, the cartridge 1 is filled with gas and a pressure of 9 bar. The total number of three pellets, that shall be introduced into the barrel 8 through the pellet loading opening 16, may optionally be inserted both before, or after, that the training cartridge 1 has been inserted into the break weapon 47. At fig 7 is disclosed that the rear pellet Pr is inserted after that the training cartridge 1 has been inserted into the barrel 51 of the break weapon 47.

[0055] The function of the preferred embodiment of the inventive cartridge 1 when shooting is referring to the figures 3, 4a, 5 and 6. For simplifying and enlarging the view of the cartridge 1, the break weapon is omitted in these figures, however, the firing pin 52 of the break weapon 47 is schematically disclosed.

[0056] The three pellets Pf, P and Pr have been introduced into the barrel 8 through the central loading opening 16 until the most rear pellet Pr is flush with the stern surface 17 of the rear part 6. That the rear pellet is flush with the stern surface 17 means that the pellet could extend a few millimetres outside the stern surface or could

be offset a few millimetres inside the stern surface 17. The two rear pellets P, Pr then closes off the barrel 8. No other closure means are arranged at the rear part 6. The front pellet Pf is typically in contact with both the inclined end surfaces 28, 29 of the valves 20, 21, or is only missing a few tenth of a millimetre to contact.

[0057] When shooting, the firing pin 52 hammers directly at the most rear pellet Pr causing all the pellets Pf, P and Pr to move forward through the barrel 8, as disclosed in figure 5. The front pellet Pf engages immediately with the inclined end surfaces 28, 29 and its rapid axial movement causes the periphery of the pellet Pr to slide along the inclined surfaces 28, 29 whereby the two opposite rods 24, 25 moves radially outwards.

[0058] The diameter enlarged seating parts 30, 31 then leave their respective seats 34, 35 of the valves 20, 21, respectively. The valves are open and the gas having a pressure of 9 bar rapidly flows in between the front pellet Pr and the succeeding rear pellet P.

[0059] The rear pellet P r both provides a closure against gas outlet from the barrel 8 and is simultaneously halted against the firing pin 52. Then, the gas pressure rapidly builds up between the front pellet Pf and the succeeding pellet P. The counterpressure against the front pellet Pf causes it to be shoot out of the barrel 8 as disclosed at figure 6.

[0060] When the front pellet Pf during its axial acceleration moved out of engagement with the inclined surfaces 28, 29 of the rods 24, 25, the rods 24, 25 moved radially in again towards the barrel 8 under pressure of the O-ring 37 and of the gas in the compartment 9. The enlarged seating parts 30, 31 then returned to their closed positions at the valve seats 34, 35 respectively. Gas-flow into the barrel 8 is then halted and the former intermediary pellet P is now in position as the next front pellet, i.e. figure 6.

[0061] The firing pin 52 hammers towards the pellets Pf with the same force each time a shoot is made. The front pellet Pf passes and influences the valves to open for the exact same time period. The same amount of gas is then released into the barrel 8 and consequently is the front pellet Pf exposed with the same pressure and velocity each time a shoot is released.

[0062] The angle A between the inclined end surfaces 28, 29 and the axial extension of the barrel is 28°, ie. fig. 4a. This satisfies an opening period for the gas flow which provide the pellets Pf having a weight of 0,25 gram with a velocity of 70 m/s +/- 2 m/s. A length of at least 5 m of the pellet-trajectory to the target is then achieved, as disclosed in figure 11. It satisfies a downscaling of approximately 1:6 from shooting with the conventional gunpowder charged shotgun cartridges to shooting with the inventive embodiment of the training cartridge 1.

[0063] If a longer opening period for the gas inlet is required, for example when shooting at a longer distance such as 7 meters or shooting with a slightly heavier pellet, the angle B of the inclined end surfaces 28, 29 can be increased further such as for example to 34° as disclosed

at figure 4b. This could for example be achieved by exchanging the movable parts 22, 23 of the valves 20, 21, disclosed in figure 4a with amended parts 22, 23 as disclosed in figure 4b. All other parts of the two figures are identical.

Due to the increased angle of 34° of the inclined end surfaces 28, 29 the inner ends 26, 27 of the rods 24, 25 of the movable parts 22, 23 extend some millimetres further into the barrel 8 as in comparison with the angle 28° disclosed in figure 4a. A longer lasting opening period for the gas inlet is then achieved, and a higher amount of gas flows in between the front pellet Pf and the next pellet P when shooting. The result is that the front pellet Pf is influenced by a longer lasting thrust with the amendment of fig. 4b.

[0064] The inventive training cartridge is then highly reliable for the shooter or rifleman to exercise with. He is completely confident that the pellet performs the exact same curve at each shoot, however without any risk of killing anybody as with the genuine bullet cartridges.

[0065] After each shoot, the succeeding rear pellet remains in the barrel and ends up as the next front pellet Pf, when a new rear pellet Pr has been introduced through the pellet loading opening 16 at the stern surface 17 of the rear part 6. The cartridge 1 is then ready for the next shoot. This is especially an advantage when applying a break weapon 47 as the cartridge can remain in the weapon when the new rear pellet Pr is inserted into the cartridge 1 as disclosed in figure 7. The cartridge is then ready for the next shot.

[0066] A series of shooting sessions were performed with untrained persons who were untrained shooters who had bought their first weapon for hunting in the nature. The dimensions of the traditional shooting field 53 were downscaled 1:6 so that the normal distance of 30 m from the shooter to the pigeon were reduced to 5 m at an inventive training shooting field 54, i.e. fig. 11.

[0067] The genuine size pigeon 55 has a velocity of 40 km/h and was reduced 1:6 in size and velocity for the inventive training pigeon target 56 having a velocity of 6,6 km/h. The velocity of the genuine gunpowder charged shotgun of 420 m/s was then reduced to 70 m/s for the plastic pellet Pf.

[0068] The participants used the above described preferred embodiment of the inventive training cartridge 1 in their own break weapon at the inventive shooting field 54 where they were standing at the spot 57 during the training shooting. After a training session they all made a surprisingly high success-rate of 70-80% hitting the downscaled pigeon 56. Quite astonishing, as untrained shooters normally has a low success-rate of 0-20% at the traditional shooting field 53. It was obvious, that when training with their own weapon and the inventive cartridge 1 loaded, the participants rapidly build up muscle memory, which is so important for improving the hit rate when shooting at moving targets later on in the nature.

[0069] The inventive training cartridge is then used in a shooters genuine weapon for exercising shooting ability

without the necessity of training at an official shooting field. If the shooter is an animal hunter, he may exercise the shooting at places in his home, such as the garage, the garden or a cellar. He is therefore a much more skilled hunter when he is out in the nature. The risk of wounding the animals instead of killing them is then reduced severely.

[0070] Another embodiment of the training cartridge 58 adapted for having only two pellets Pf, Pr in the barrel 59 when shooting is disclosed in figure 9. Consequently, the axial position of the two gas flow channels 18, 19 with the valves 20, 21 respectively, are one barrel diameter closer to the pellet loading opening 16 than for the inventive embodiment adapted for accommodating three pellets Pf, P and Pr, i.e. figures 3-6. All other details are equal for the two embodiments. When leaving out one pellet the overall friction between the pellets and the barrel 59 is the lowest possible. However, only one rear pellet Pr also provides less tightening against the gas when shooting.

[0071] A further embodiment of the training cartridge 60 adapted for having four pellets Pf, P, P, Pr in the barrel 61 when shooting, is disclosed in figure 10. Consequently, the axial position of the two gas flow channels 18, 19 with the valves 20, 21 respectively, are one barrel diameter more distant to the pellet loading opening 16 than for the inventive embodiment adapted for accommodating three pellets Pf, P and Pr, i.e. figures 3-6. All other details are equal for the two embodiments. When having one more pellet the overall friction between the pellets and the barrel 61 is higher. However, three rear pellets P, P and Pr provides superior tightening against the gas when shooting.

- 1: training cartridge for shotgun
- 2: hollow casing
- 3: front end
- 4: rear end
- 5: front part
- 6: rear part
- 7: barrel tube
- 8: barrel
- 9: gas compartment
- 10: inside of outer hollow casing
- 11: inside of front part
- 12: inside of rear part
- 13: outside of barrel tube
- 14: discharge opening
- 15: opposite end of barrel tube
- 16: pellet loading opening
- 17: stern surface of rear part
- 18: gas flow channel
- 19: gas flow channel
- 20: valve
- 21: valve
- 22: movable part of valve
- 23: movable part of valve
- 24: rod

- 25: rod
- 26: inner end of rod
- 27: inner end of rod
- 28: inclined end surface
- 5 29: inclined end surface
- 30: diameter enlarged seating part
- 31: diameter enlarged seating part
- 32: outer end of rod
- 33: outer end of rod
- 10 34: seat of valve
- 35: seat of valve
- 36: rubber sheave at seat
- 37: rubber O-ring
- 38: groove
- 15 39: groove
- 40: thread
- 41: thread
- 42: O-ring
- 43: gas refill opening
- 20 44: channel
- 45: rubber sheave
- 46: gas container
- 47: break weapon
- 48: outside of hollow casing
- 25 49: peripheral grooves at outside of cartridge
- 50: O-rings at outside of cartridge
- 51: barrel of break weapon
- 52: firing pin of break weapon
- 53: traditional shooting field
- 30 54: inventive training shooting field
- 55: genuine size pigeon
- 56: inventive training size pigeon
- 57: spot for shooter
- 58: training cartridge for two pellets
- 35 59: barrel for two pellets
- 60: training cartridge for four pellets
- 61: barrel for four pellets

- A: angle between inclined end surface of valve rod and axial extension
- 40 B: angle between inclined end surface of valve rod and axial extension
- P: intermediary pellet
- Pf: front pellet
- 45 Pr: rear pellet

Claims

- 50 1. Training cartridge (1) for a shotgun (47), comprising an outer hollow casing (2) closed at its opposite ends (3,4) by a front part (5) and a rear part (6), respectively, and a concentrically arranged, inner barrel tube (7) for accommodating at least two pellets (Pf, P, Pr) before shooting,
- 55 a compartment (9) for accommodating pressurized gas defined between the inside (10) of the outer hollow casing (2), the insides (11, 12) of the front and

- the rear parts (5, 6) and the outside (13) of the barrel tube (7),
 that the barrel (8) of the barrel tube (7) extends out through a discharge opening (14) at the front part (5) for launching the front pellet (Pf) of the at least two pellets (Pf, P, Pr) when shooting,
characterized in,
that the barrel (8) of the barrel tube (7) at its opposite end (15) extends to a pellet loading opening (16) at the stern surface (17) of the rear part (6),
that at least one gas flow channel (18;19) with a valve (20;21) is arranged extending through the side of the barrel tube (7) at an axial position of more than 11/2 barrel diameter from the pellet loading opening (16), and
that the valve (20;21) has a movable part (22;23) extending into the barrel (8).
2. Training cartridge (1) for a shotgun (47) according to claim 1, **characterized in,**
that at least two gas flow channels (18, 19) with a valve (20, 21) are arranged at the same axial position of the barrel tube (7),
 the two channels (18, 19) with valves (20, 21) being opposite each other or the three or more openings with valves being evenly distributed around the periphery of the barrel tube (7).
 3. Training cartridge for a shotgun according to claim 1 or 2, **characterized in,**
that the movable part (22; 23) of the valve (20; 21) extending into the barrel (8) is a rod (24; 25) extending radially through the gas flow channel (18; 19) with its inner end (26; 27) into the barrel tube (7),
 and **that** the inner end (26; 27) of the rod (24; 25) has an inclined end surface (28; 29) facing towards the rear part (6).
 4. Training cartridge (1) for a shotgun (47) according to claim 3, **characterized in, that** the angle (A; B) between the inclined end surface ((28, 29) and the axial extension of the barrel (8) is between 10° and 40°.
 5. Training cartridge (1) for a shotgun (2) according to one or more of claims 1-4,
characterized in,
that the valve (20; 21) is a seat valve of which the rod pin (24; 25) has a diameter enlarged seating part (30; 31) at the outer end (32; 33) adapted to engage with a seat (34; 35) arranged at the outside (13) of the barrel tube (7) in the gas compartment (9).
 6. Training cartridge (1) for a shotgun (2) according to claim 5, **characterized in, that** resilient spring means (37) are arranged adapted to maintain radially inwardly directed spring force against the enlarged seating part (30; 31) in the open position thereof.
 7. Training cartridge (1) for a shotgun (47) according to claim 6, **characterized in, that** the resilient spring means is a rubber O-ring (37) arranged around the outer periphery of the barrel tube (7) and of the enlarged seating part (30; 31).
 8. Training cartridge (1) for a shotgun (47) according to one or more of claims 1-7, **characterized in,**
that a gas refill opening (43) is arranged in the rear closure part (6), which via a channel (44) through the rear closure part (6) is connected to the gas compartment (9),
 and which channel (44) at the inside opening is closed by a further valve means (45).
 9. Training cartridge (1) for a shotgun (47) according to one or more of claims 1-8, **characterized in,**
that the inner diameter of the barrel tube (7) is adapted to be 0,015-0,02 mm greater than the diameter of a particular standard plastic pellet (Pf, P, Pr) to be applied in the training cartridge (1).
 10. Training cartridge (1) for a shotgun (47) according to claim 9, **characterized in, that** the inner diameter of the barrel tube (7) is between 6,000 mm and 6,015 mm when the plastic pellets (Pf, P, Pr) are standard plastic pellets having a diameter of 5,950 mm +/- 0,010 mm.
 11. Training cartridge (1, 58, 60) for a shotgun (47) according to one or more of claims 1-10, **characterized in, that** the length of the barrel (58, 1, 60) is adapted to accommodate two or three or four pellets before shooting releasing only the front pellet (Pf).
 12. Use of training cartridge (1, 58, 60) for a shotgun according to one or more of claims 1-11 in a break action weapon (47).
 13. Use of training cartridge (1, 58, 60) for a shotgun according to one or more of claims 1-11 in a riffle.
 14. Use of training cartridge (1, 58, 60) for a shotgun according to one or more of claims 1-11 in a pistol or revolver.
 15. Use of training cartridge (1, 58, 60) according to one of claims 12-14 in the shooter's personal shotgun.
 16. Use of training cartridge (1, 58, 60) for a shotgun according to one of claims 12-15 when applying a pressure of 5-15 bar in the gas compartment (9) and shooting with plastic pellets (Pf, P, Pr) having weight from 0,12 gram to 0,48 gram.
 17. Method of using training cartridge (1, 58, 60) accord-

ing to one or more of claims 1-16 performing the steps of:

- placing the cartridge in shooters shotgun,
- loading gas into gas compartment of cartridge , 5
- loading plastic pellets into cartridge,
- arranging a target (56) in a distance of 4-6 m from shooter, and
- shooting a pellet one at a time against the target (56) with intermittent loading of a pellet into the loading opening at the stern surface of the training cartridge. 10

18. Method according to claim 17, further performing the step of: 15

- moving the target (56) with a speed of 4 - 8 km/h.

20

25

30

35

40

45

50

55

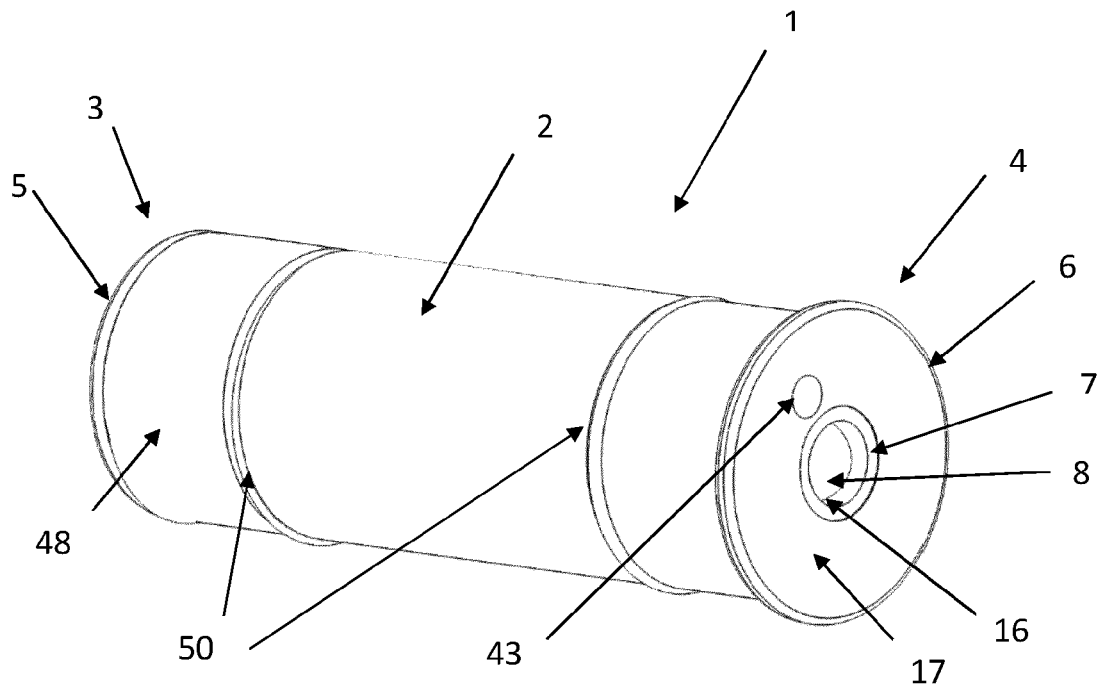


Fig. 1

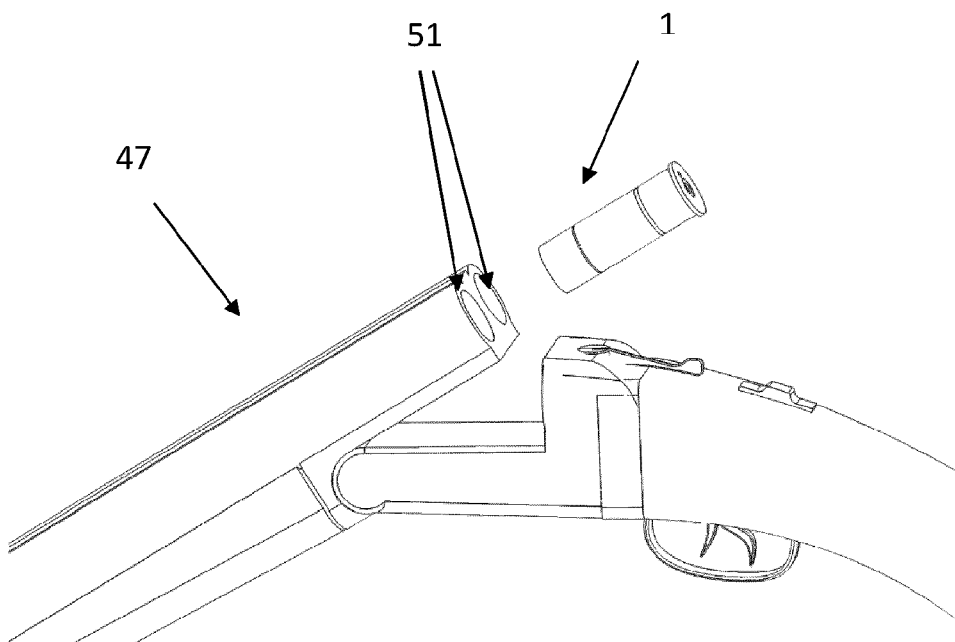


Fig. 2

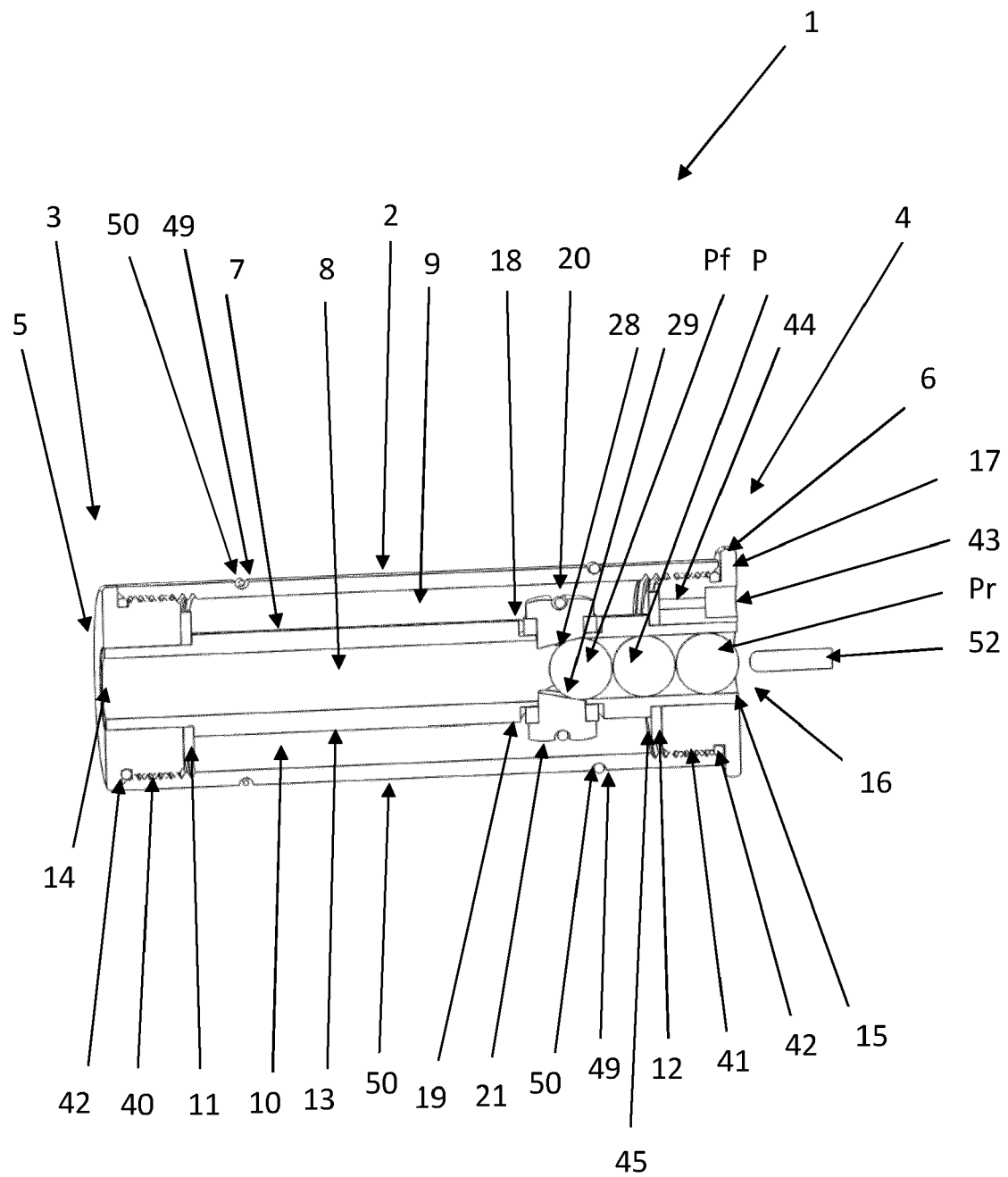


Fig. 3

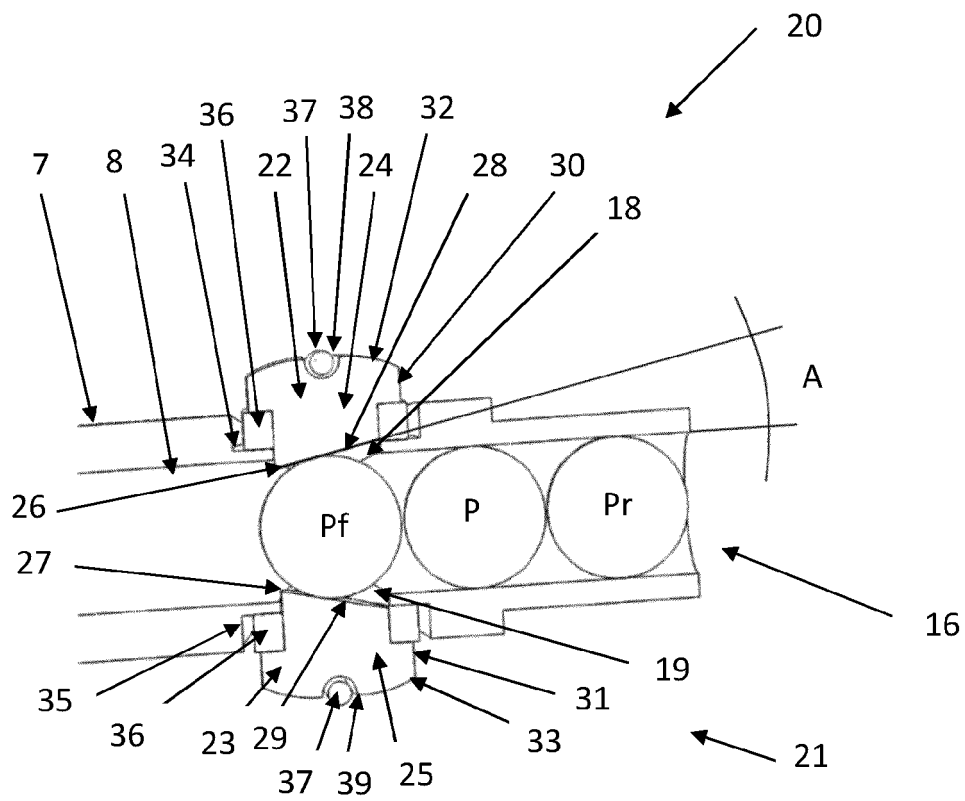


Fig. 4a

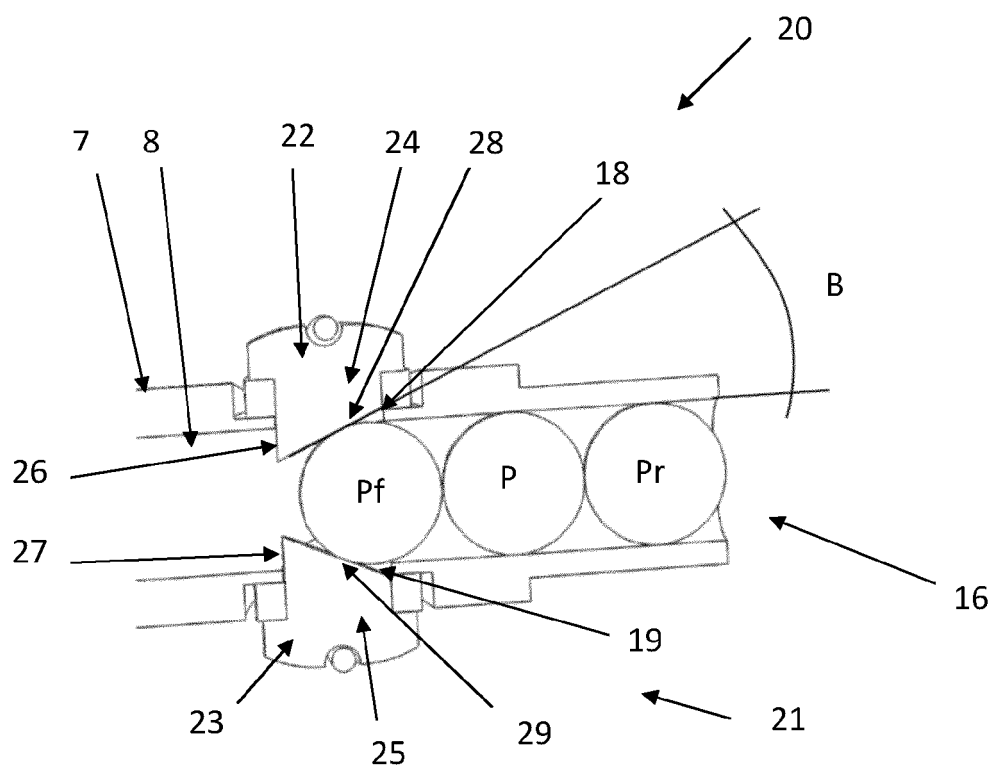


Fig. 4b

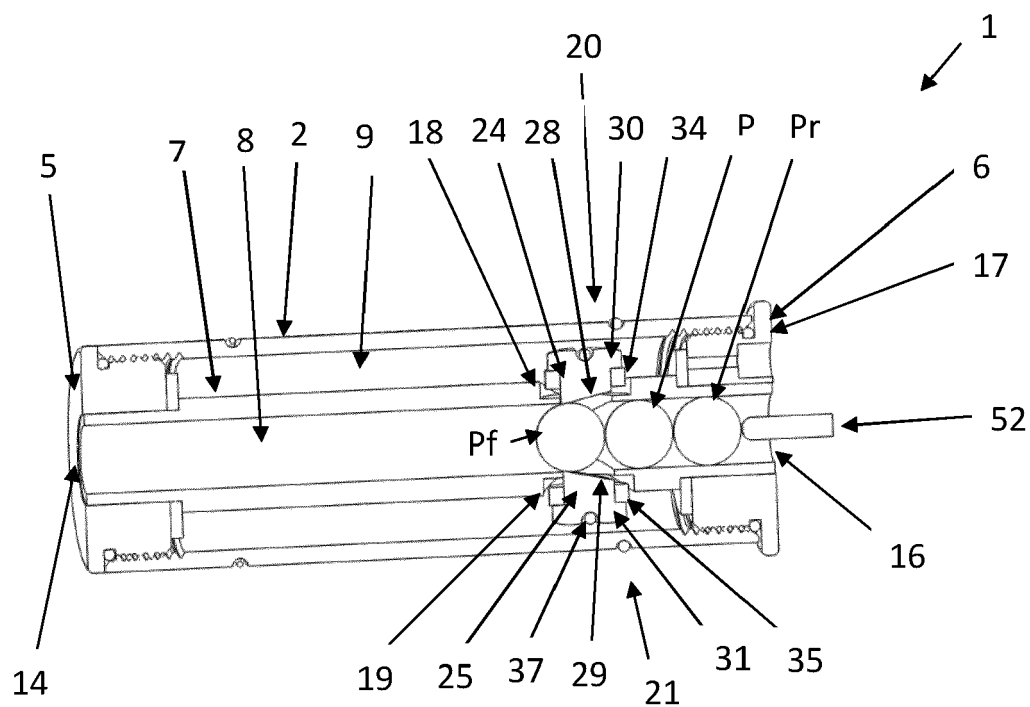


Fig. 5

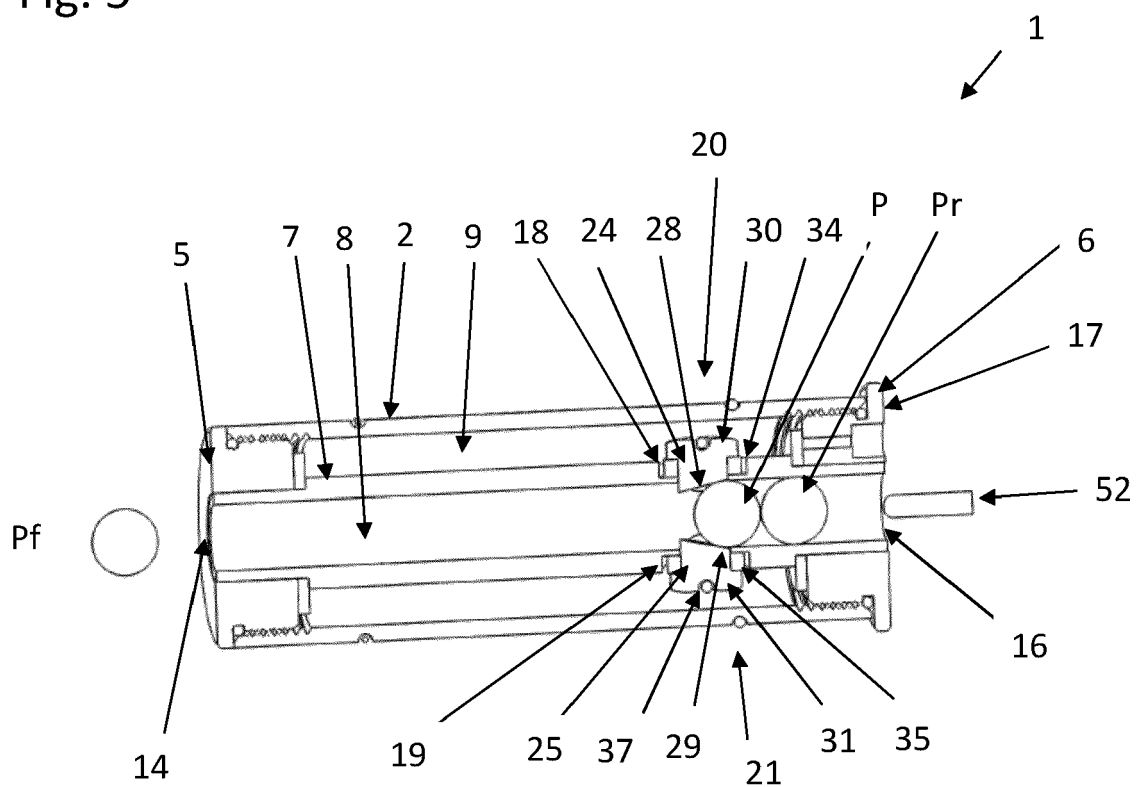


Fig. 6

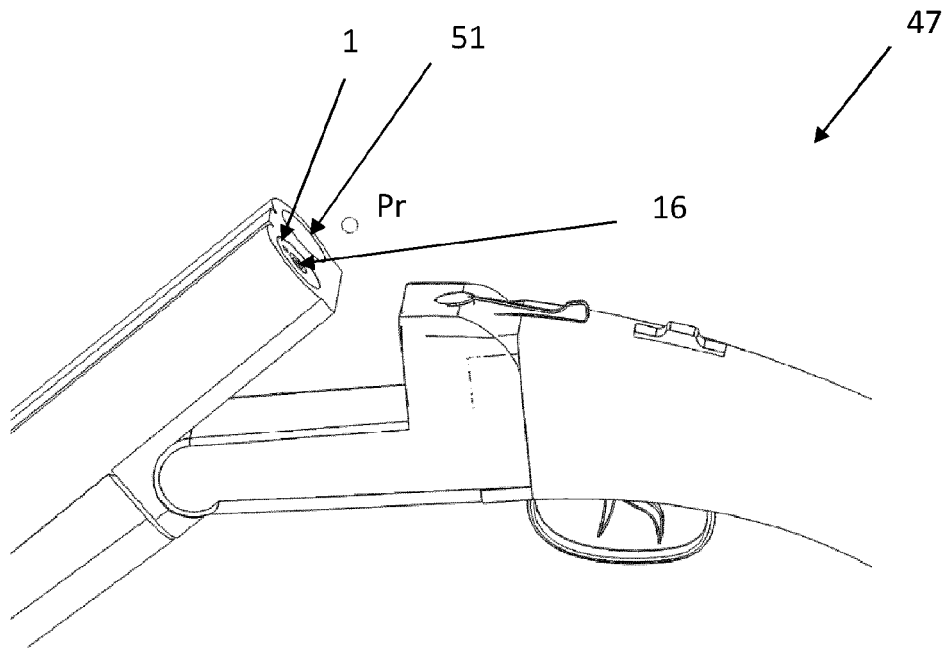


Fig. 7

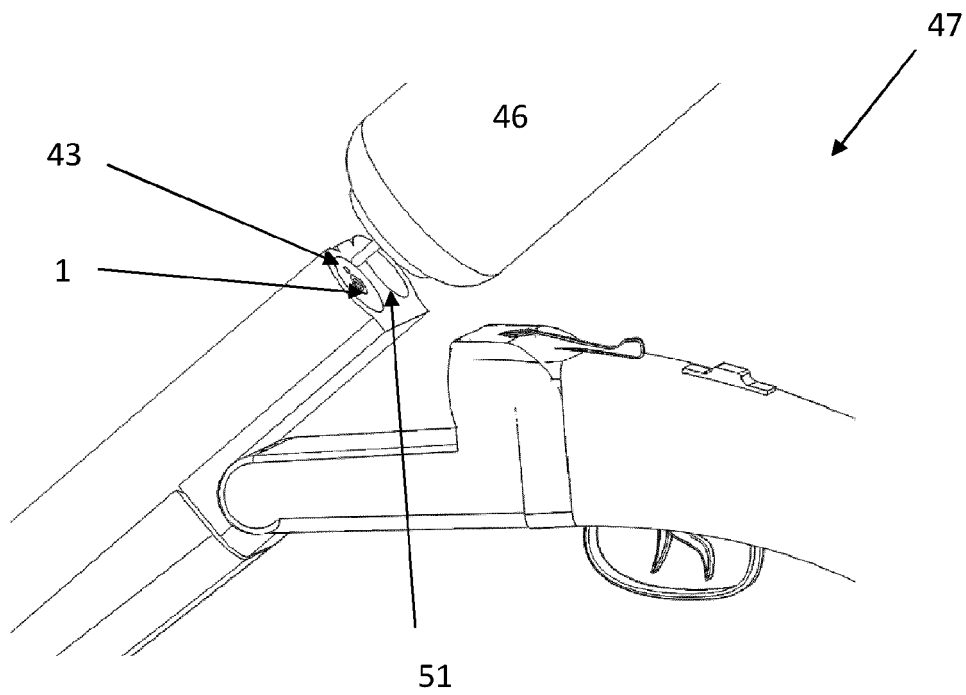


Fig. 8

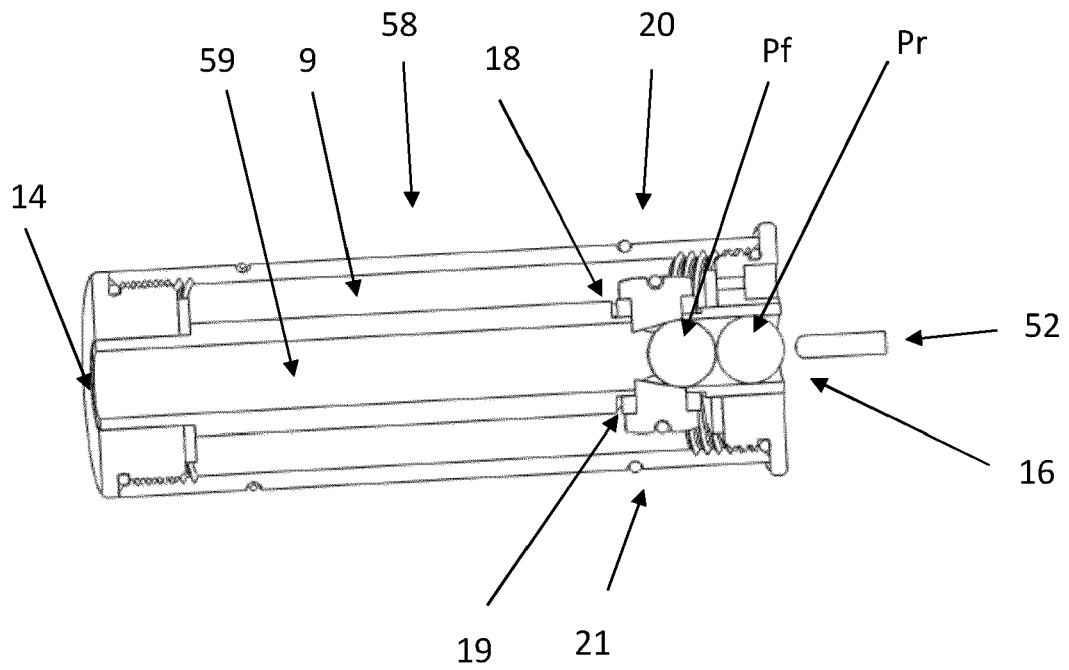


Fig. 9

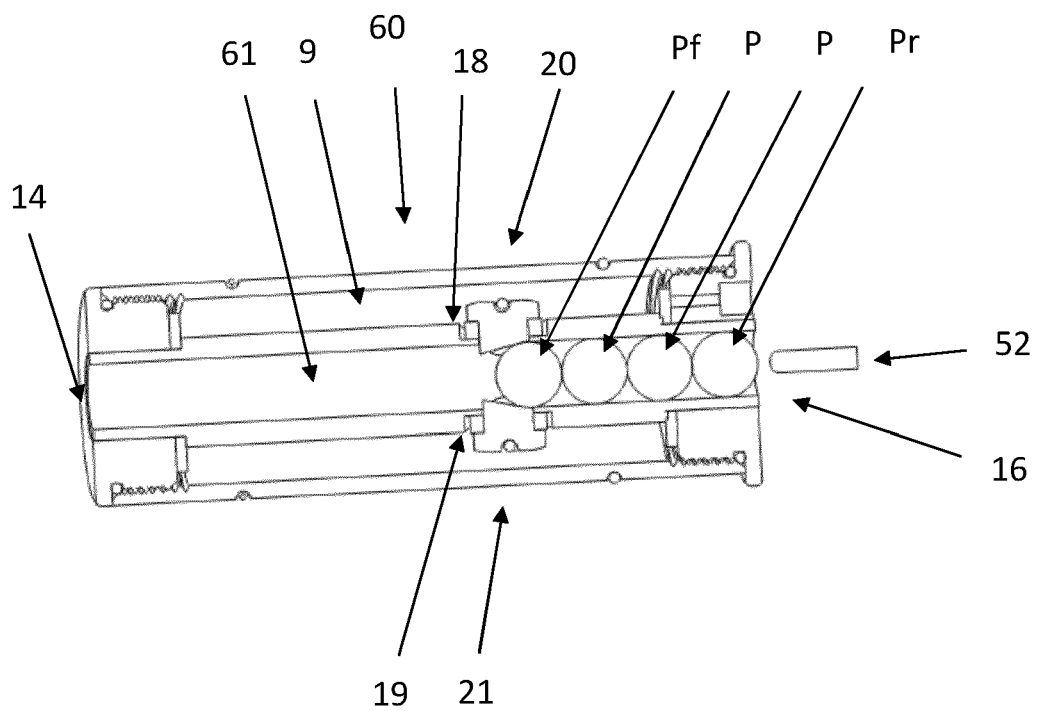


Fig. 10

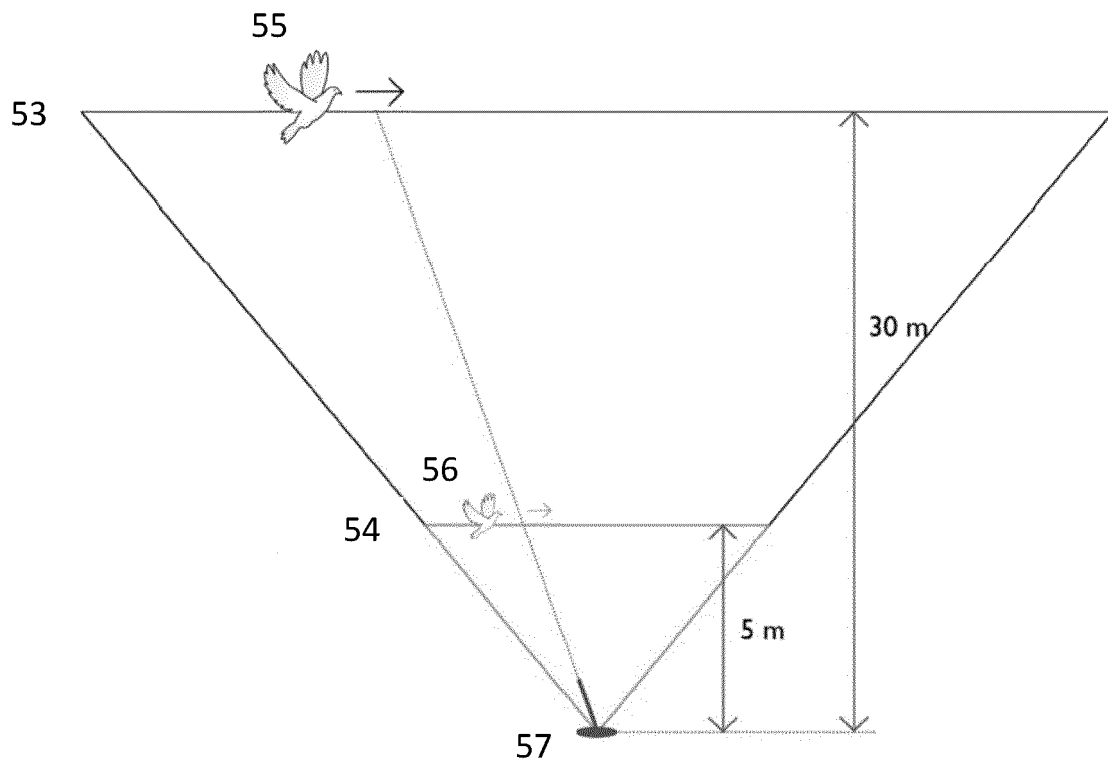


Fig. 11



EUROPEAN SEARCH REPORT

Application Number
EP 20 19 1617

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	KR 870 004 192 U (NO MYONG SU [KR]) 31 March 1987 (1987-03-31) * abstract; figures *	1-18	INV. F42B6/10 F41B11/62
A	DE 298 07 279 U1 (VOELKER RAINER [DE]; BOEDDECKER JUERGEN [DE]) 5 November 1998 (1998-11-05) * claims; figures *	1-18	ADD. F41J9/02 F41J9/08
A	GB 1 601 917 A (HILVENNA LTD) 4 November 1981 (1981-11-04) * figure 1 * * page 1, line 55 - page 2, line 7 * * page 2, lines 53-65 *	1-18	
A	US 6 428 384 B1 (SU SUSAN [TW]) 6 August 2002 (2002-08-06) * figures 4-7 * * column 2, line 29 - column 4, line 6 *	1-18	
			TECHNICAL FIELDS SEARCHED (IPC)
			F41B F42B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 January 2021	Examiner Schwingel, Dirk
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 19 1617

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-01-2021

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 870004192 U	31-03-1987	NONE	
DE 29807279 U1	05-11-1998	NONE	
GB 1601917 A	04-11-1981	AU 2959777 A	26-04-1979
		BE 860116 A	15-02-1978
		DE 2747932 A1	03-05-1978
		ES 463587 A1	16-10-1978
		FR 2369537 A1	26-05-1978
		GB 1601917 A	04-11-1981
		JP S5355698 A	20-05-1978
		ZA 776038 B	30-05-1979
US 6428384 B1	06-08-2002	NONE	

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82