

### **Firearm with Blank Cartridge Device**

The invention concerns a firearm according to the principal clause of Claim 1.

Position designations, like "front", "across" or the like, are defined as follows: "front" always points in the direction of shooting, "lengthwise" always runs parallel to the axis of the bore, "top" starts from the normal horizontal firing position of the weapon.

This type of firearm with a flash reducer and blank cartridge device is known (US PS 3 744 370) and has since proven itself; the blank cartridge device of the invention can be designed in its details that concern gas buildup and trapping of shells and particles, like the known blank cartridge device; the contents of the mentioned document are expressly included in the present disclosure. Furthermore, the following publications were known to the Applicant: US patent 3 766 822, US patent 3 732 776 and CH patent 381 569.

The known firearm, preferably an automatic weapon, has outside threading on the front end of the barrel, on which a flash reducer is attached.

This known flash reducer consists of a sleeve, having inside threading on the rear end, with which the flash reducer can be firmly screwed onto the outside threading of the automatic weapon. A cylindrical bore section is connected to the inside threading, whose diameter is only slightly larger than the largest diameter of the barrel bore; the purpose of this cylindrical section is to protect the muzzle of the barrel from damage, which can occur perhaps from improper cleaning. A nozzle-like bore section that enlarges toward the front end of the flash reducer is connected to the cylindrical section. The side wall of the nozzle section is perforated by radial openings that are generally designed as longitudinal slits. The

front peripheral edge of the nozzle section has two notches opposite each other in the transverse direction, which serve for attachment of a screwdriver-like tool, in order to screw the flash reducer onto the barrel or unscrew it from the barrel. The flash reducer can also have flattenings on its outside for attachment of a screwdriver.

A similar blank cartridge device has an essentially cylindrical block with a central blind hole, into which a sleeve is inserted, which is open to the rear and whose inside diameter is much smaller than that of the barrel. On the front part of the outside periphery, the block has at least one spiral groove. This is connected to the blind hole by at least one transverse hole. The block is welded into a bushing, so that the spiral groove is covered from the outside.

If a blank cartridge is fired in the firearm with the blank cartridge device mounted, the propellant gases that form are forced to flow through the sleeve into the blind hole and then through the covered, narrow spiral groove. The pressure is increased in the barrel in this case quite significantly, so that the gas pressure or recoil pulse required to reload the firearm is built up. Any foreign objects that are released during firing of the blank cartridge, say, splinters of a wooden projectile or particles of a burst plastic cartridge, and which reach the spiral groove, are placed there in eddy-like motion, so that after leaving the spiral groove, they are carried outward, reduced in size, with a high centrifugal force component and are trapped by the forward protruding bushing. If a live cartridge is inadvertently loaded into the firearm, then it is braked in the sleeve and, if necessary, trapped by the bottom of the blind hole. The propellant gases are relieved through the spiral groove. The barrel withstands the briefly developed overpressure undamaged, as does the mount on the muzzle. Only the blank cartridge device is damaged, so that it must be replaced.

However, unexpected problems develop in this blank cartridge device, which must be mounted instead of the flash reducer: in order for the flash reducer not to loosen despite firing, its inside threading must be forcefully tightened onto the outside threading of the barrel; tools of the aforementioned type are furnished to the armorer of the troops, who issues the firearm, in order to unscrew the flash reducer before use of the blank cartridge device and then screw it back on. It has now turned out that the armorers do not pass along these tools to save themselves the effort of administrative work in case of loss.

At any rate, in each new weapon before its first issue, the flash reducer is loosened and only slightly tightened by hand.

In the case of a fixed flash reducer, the troops then use a bayonet or any other tool which is inserted through the radial slit in the side wall of the flash reducer, in order to loosen the flash reducer, so that the flash reducers run the risk of being damaged. Loosely screwed-on flash reducers significantly influence shooting accuracy and can also be lost.

This problem can be eliminated by a corresponding regulation, which perhaps assigns an inspector to bring along tools of the mentioned type and ensure their proper use when weapons are issued and returned before and after use of blank cartridge devices.

These problems, however, are only partially solved by the known blank cartridge device mentioned at the outset (US PS 3 744 370), in which the blank cartridge device can be pushed over the flash reducer and attached to it or to the barrel. When the blank cartridge device is mounted, the flash reducer, therefore, remains in its position; it need no longer be removed by the troops during normal use of the weapons. On the other hand, the blank cartridge device is applied as required and then removed again.

Advantages are gained here: the flash reducer permanently protects the muzzle, because it is never unscrewed from it. The flash reducer can also be screwed on or shrunk on by heat, so that it cannot be loosened by simple means. It is even possible to weld the flash reducer or to produce it in one piece with the barrel. The most favorable procedure can, therefore, be chosen for the flash reducer and its attachment, since it no longer has to be unscrewed by the troops, as before.

In principle, it is possible and might even be advantageous to make the blank cartridge device from a single piece that can be pushed over the flash reducer, with a hole open to the rear.

However, it is preferable that the block be attached in the front region of a bushing, whose rear region can be easily pushed over the flash reducer.

Thus, the bushing cannot only close a spiral groove in the cylindrical outside surface of the block, so that a coil-like gas outlet channel is created, but the bushing can also be produced as a simple piece equipped with a through hole, whose rear section is designed to fit the

outside diameter of the flash reducer. This preferably has an essentially cylindrical outside contour.

For example, the block can be welded into the bushing, but preferably is attached in the bushing by means of a pressed-in transverse pin. Heat distortion need no longer be reckoned with during production, which could pose problems in the fitting surfaces of the blank cartridge device according to the invention.

In principle, it would be conceivable to push the blank cartridge device like a can from the front onto the flash reducer. However, since a high gas pressure from the barrel acts on the blank cartridge device, it is preferable that the block be lengthened rearward by an end connector, which is penetrated by a blind hole and fits into the coaxial, cylindrical hole of the flash reducer when the blank cartridge device is mounted.

The impact surface for the gas pressure is, therefore, only slightly larger than the cross-sectional surface of the barrel, so that the force required to fasten the device on the muzzle is minimized. This is of particular significance when a live cartridge is inadvertently fired with the blank cartridge device mounted, because a particularly high gas pressure occurs, in addition to the firing energy acting on the device.

A preferred modification also considers this accident, according to which the transition between the end section and the narrowed blind hole lies within the expanding hole of the flash reducer when the blank cartridge device is mounted. If a shot enters the narrowed blind hole, this and the end connector are widened; the shape change work consumed here reduces the impulse during impact of the shot against the bottom of the blind hole. The widening of the end connector, however, only occurs at such a site, so that the flash reducer is not affected by the widening. After removal of the damaged blank cartridge device, the weapon itself, together with the flash reducer, remains undamaged.

The blank cartridge device according to the invention can be fastened on the flash reducer, like in the known one, by a threaded connection. If the barrel is sufficiently thick, it can also surround the flash reducer and engage in threading on the barrel. It is then generally immediately obvious that the blank cartridge device has not been screwed on far enough. However, as will be further explained below, it is also possible, and even advantageous, to

attach the blank cartridge device by means of a different type of mount that engages, for example, behind a protrusion of the flash reducer, so that the blank cartridge device can be mounted with a single movement.

To check reliable seating of the flash reducer, it is proposed according to Claim 1 that a stop ring that moves in the longitudinal direction be arranged on the outside of the end connector, which is forced rearward against a stop by a pressure spring supported on the block and has an outside diameter such that during positioning of the blank cartridge device on the flash reducer, it runs against the wall of the widening hole and compresses the compression spring during further positioning.

During positioning, the blank cartridge device must therefore be pressed onto the flash reducer, overcoming the force of a compression spring until the mount engages and secures the blank cartridge device; if this is not the case, then the compression spring pushes the blank cartridge device forward again, where its position indicates beyond doubt that no attachment has occurred.

This compression spring device, however, also has the advantage of guaranteeing trouble-free seating of the blank cartridge device on the muzzle despite the high tolerances, and preventing it from rattling and wobbling there and, as a result, shaking out and loosening.

It is also advantageous that the bushing has passages arranged, so that the propellant gases escape through the flash reducer and the mentioned passages when the compression spring is relieved, i.e., when the blank cartridge device is mounted, but not fastened. If it escapes the attention of the shooter that the blank cartridge device is not attached and is therefore pushed forward by the compression spring and the shooter then fires a blank cartridge, the blank cartridge device is not flung forward like a rifle grenade, but the propellant gases can be diverted laterally; in any event, the blank cartridge device falls to the ground.

According to Claim 2, it is advantageous that a seal for gas-tight engagement into the coaxial, cylindrical opening of the flash reducer is arranged on the free end of the end connector on its outside periphery. In this fashion, the otherwise occurring erosion in the gap between the end connector and the wall of the opening is prevented and, at the same time, precise seating of the blank cartridge device is guaranteed.

Jamming of the flash reducer by residues of penetrating propellant gases is also prevented by an axially extended sealing gap, since these gases do not penetrate into the gap because of the seal.

A soft plastic ring or the like could advantageously be used as seal; according to the invention (Claim 3), however, it is proposed that the seal have at least one piston ring-like sealing ring. This type of sealing ring can consist of steel, hard and optionally reinforced plastic or another piston ring material and because of the rigid piston ring material, has the advantage that this cannot be pressed by pressure into a large gap between the end connector and wall of the hole. Larger, still admissible tolerances are therefore possible.

As already indicated above, the blank cartridge device could be screwed with the flash reducer or barrel. However, according to Claim 4, it is particularly advantageous that, when the blank cartridge device is pushed onto the flash reducer, its rear end extends over a shoulder or the rear end of the flash reducer forming a shoulder and that, on the rear end of the blank cartridge device, a locking device that engages behind the shoulder is mounted. The blank cartridge device is therefore attached so that it can be emplaced with one movement, in which the aforementioned compression spring ensures that, during mounting, it only remains in its position when locking has been effective.

The locking device can have radial claws that engage behind the cited shoulder. However, preferably (Claim 5) the locking device is formed from a nonradial, transversely running blocking element. This can engage over a larger angular range with the shoulder than a radial element, so that only a single such blocking element can be fully adequate.

In the design of the blocking element, it is particularly advantageous according to Claim 6 that the blocking element is arranged mobile in a transverse groove of the blank cartridge device or its bushing, and that the blocking element has a design that protrudes above the outer contour of the blank cartridge device or its sleeve, preferably on the top, with the incompletely secured blocking element. The blocking element therefore forms a clearly visible indication as to whether the locking device is closed or not, if the compression spring, because of soiling or the like, should become ineffective, if, perhaps after longer use of the weapon in blank shooting, the blocking element were to loosen for any reason.

According to Claim 7, the blocking element is preferably designed as a detent, which is mounted to pivot on one end in the transverse groove, in which the detent is forced by means of a detent spring with its free end into a mating surface and is designed as a handle that fully enters the transverse groove when the detent is fully secured.

In a detent, a small angular change in position of the detent is sufficient, in order to make the handle emerge from the transverse groove visibly. The detent spring, however, prevents loosening of the detent, owing to inertial forces. Moreover, when the detent is in the mating surface, the handle cannot be grasped from the outside with a finger or similar blunt object, so that inadvertent loosening of the detent is also ruled out, if the shooter, for example, is passing through brush.

To remove the blank cartridge device, the handle can be pushed back, grasped from behind and lifted out of the transverse groove, perhaps by means of the tip of a pocketknife-corkscrew, against the action of the detent spring.

The object of the invention is further explained with reference to the accompanying drawing, which shows a preferred practical example of the invention and in which:

- Fig. 1 shows an enlarged longitudinal section through the muzzle of a firearm with the flash reducer screwed on and the blank cartridge device mounted according to a first variant of the invention,
- Fig. 2 shows a cross-section through the blank cartridge device depicted in Fig. 1 and its mount,
- Fig. 3 shows an enlarged longitudinal section through the muzzle of a firearm with the flash reducer screwed on and the blank cartridge device mounted according to a second variant of the invention, which is equipped with a compression spring device, and
- Fig. 4 shows the arrangement of Fig. 3, but with the blank cartridge device only loosely mounted.

In all figures the same reference numbers are used for the same parts or elements.

Reference (1) shows the muzzle of the barrel of an automatic weapon having outside threading (3), behind which a protruding collar (5) is formed. (7) denotes the bore axis of barrel (1), which forms the center axis of barrel (1), of flash reducer (9) and blank cartridge device (25).

The flash reducer (9) is penetrated by a central bore, whose individual sections from back to front are named in succession: a centering bore (11), which is mounted centered on collar (5), an internal threaded section (13), which is screwed onto outside threading (3), a coaxial, cylindrical bore (15), whose diameter is greater than that of the barrel bore and a widening bore (17) that begins with a cylindrical section, whose diameter is greater than that of the coaxial, cylindrical bore (15) and grades into a section that widens sharply in conical fashion forward.

The wall of the flash reducer (9) in the region of the expanding bore (17) is perforated by six longitudinal slits (19), which cause dispersion of the propellant gases leaving the muzzle of barrel (1). A recess is formed in the top of collar (5) of barrel (1), into which a safety clamp (21) can fall, which is mounted near the rear end of flash reducer (9) and prevents inadvertent loosening of the flash reducer (9).

Two notches (not shown) for mounting of a wrench, with which the flash reducer (9) can be screwed on and unscrewed, are formed opposite each other in the front peripheral edge of flash reducer (9). The blank cartridge device (25) has an external, tubular bushing (27), in which the rear part of the inside bore is formed to be pushed over the flash reducer (9).

The front fifth of the inside bore of bushing (27) has a slightly smaller diameter than the remaining inside bore and grades into a shoulder. The front end of the inside bore is somewhat reduced in diameter. A block (29), which, in turn, has a head (31), a shoulder (33) and an end connector (35), is fitted into the inside bore. The head has an essentially cylindrical outside contour and fits into the frontmost fifth of the inside bore of bushing (27), where it ends just before its reduced front end. A double-threaded trapezoidal thread is cut into the peripheral surface of the head, whose groove is covered outward by the inside wall of bushing (27), so that a coil-shaped channel (37) is formed.

The shoulder (33) is designed cup-like with a center recess open to the rear, which is surrounded by a peripheral sleeve. This peripheral sleeve fits in the larger part of the inside bore, on whose recess shoulder (33) sits. A pressed-in pin (49), which secures block (29) in bushing (27), extends through the peripheral sleeve of shoulder (33) and the wall of bushing (27), but can be pushed inward so that, if necessary, perhaps for the purpose of repair, the block (29) can be removed from bushing (27).

Starting from the center of the bottom of the recess, a center end connector (35) extends rearward, which is perforated in the center by a blind hole (39), which ends in the front in head (31). Just before reaching its end, the blind hole (39) is connected through a transverse hole (no reference number) to the rear end of the coil-like channel (37). Starting from the front, the blind hole (39) discharges into an initial section (41) with enlarged diameter, which discharges on the rearmost end of the end connector opposite the bore of barrel (1) (Fig. 1). The diameter of the initial section (41) is slightly larger than the inside diameter of barrel (1), whereas the diameter of the blind hole (39) is much smaller. The conical transition between the initial section (41) and the blind hole lies in the region of the rear end of the expanding bore (17) when the blank cartridge device is mounted (Fig. 1).

Close to its rear end, the outside diameter of the end connector (35) is enlarged and forms a stop (43) facing forward, against which a ring (45) abuts from the front. A compression spring (47) that surrounds end connector (35) and forces ring (45) to the rear against top (43) is used between this ring (45) and the bottom of the cup-like shoulder (33) in the variant of Figures 3 and 4.

An annular groove, in which three sealing rings (51) are positioned next to each other, similar to piston rings, is formed in the covered end of end connector (35). As is apparent from Fig. 1, the covered end of end connector (35) sits precisely in the coaxial, cylindrical bore (15) and is sealed against its wall when the blank cartridge device (25) is mounted. The opening of the initial section (41) of the blind hole (39) then lies precisely opposite the muzzle of barrel (1) at a small spacing.

The compression spring (47) and the ring (45) of the version in Figures 3 and 4 are missing in the version of Fig. 1. When the blank cartridge device (25) according to Figures 3 or 4 is mounted on the flash reducer (9), the end connector is first introduced into the expanding

bore (17), until ring (45) lies against projection (65) (Fig. 4). If the blank cartridge device (25) is now pushed farther, this is only possible against the resistance of the increasingly compressed compression spring (47), which, if one releases the blank cartridge device in this state, immediately forces it back forward into the position of Fig. 4. Only when a locking device (53) (see Fig. 2) secures the blank cartridge device (25), does it remain in the position depicted in Fig. 3.

The locking device (53) is designed as follows: a transversely running detent (55), mounted to pivot on a longitudinal pin with an elongated hole, is arranged in a transverse groove (57) (Fig. 2) near the rear end of bushing (27), the pin being arranged near one end of transverse groove (57). A detent spring (59) forces the detent (55) away from the longitudinal pin. Near the other end of the transverse groove, a second longitudinal pin is arranged and the free end of the detent (55) has a notch designed complementary to the contour of the second longitudinal pin. The detent (55) has a handle (61) on the top, whose tip precisely enters transverse groove (57) when the detent (55) is locked in, so that it is sealed flush with its top edge.

When the blank cartridge device (25) is mounted on the flash reducer (9), the detent (55) is folded so far upward that it exposes the inside contour of bushing (27). The blank cartridge device (25) is now forced backward against the force of compression spring (47), until shoulder (33) sits on the front end edge of flash reducer (9). The handle (61) on detent (55) is now pushed downward with the thumb and the detent (55) is pivoted downward into longitudinal groove (57). Detent (55) then enters longitudinal groove (57), until handle (61) slides out from beneath the thumb and is pressed fully into transverse groove (57) on its tip. The notch on the free end of detent (55) now locks into the second longitudinal pin and can only be released by applying a force, which is necessary to compress detent spring (59). The detent (55) engages behind the rear end of flash reducer (9). The force of compression spring (47) also presses the detent (55) against this rear end of flash reducer (9), so that the detent (55) is additionally secured by friction in its position.

To remove the blank cartridge device (25), this is briefly forced from the front against barrel (1), in which the detent (55) is pushed in the longitudinal direction simultaneously, for example, with a nail against handle (61). The detent spring (59) is then compressed and the

notch on the free end of detent (55) is moved away from the second longitudinal pin, until the detent (55) pivots upward as a result of the force acting on it off-center.

During shooting of blank cartridges, the propellant gases enter the blind hole (39) and pass through the transverse hole (no reference number) into the coil-like channel (37), leaving it at its front end, and they emerge through bushing (27). Any particles that were entrained in the gas stream also reach the coil-like channel (37) and pass through it at such a high speed that after leaving, they are pressed against the inside surface of bushing (27) by centrifugal force, where they are then braked before they can leave it through its narrowed opening. Owing to the high flow resistance of the outflow path from blind hole (39), the transverse hole and the coil-like channel (37), gas buildup occurs, which allows the gas pressure in barrel (1) to rise so far that the automatic weapon can execute all loading functions free of disturbance.

If a live cartridge is inadvertently fired when the blank cartridge device (25) is mounted, the shot reaches the blind hole (39) unhampered through the initial section (41), whose diameter is much smaller than that of the shot. This is therefore deformed in the blind hole (39) and braked and the front part of end connector (35) is deformed, in turn. Its rear part with the thickened end remains undeformed, on the other hand. The shot material collects on the bottom of blind hole (39), whereas the gases can escape through the transverse hole behind the shot material. The detent (55), subjected to shearing, withstands the increased load occurring during firing of a live cartridge, so that the (damaged) blank cartridge device (25) can be removed from the flash reducer (9). A repair might even be possible, since the bushing (27) could remain undamaged and the damaged block (29) can be removed by knocking out pin (49).

The bushing (27) has passages (63); if the blank cartridge device (25) is not locked and assumes the position of Fig. 4, and if a blank cartridge is fired in this condition, then the propellant gases escape through the longitudinal slit (19) of the flash reducer (9) and the passages (63) in the bushing (27) of blank cartridge device (25).

## Claims

1. Firearm with a barrel (1),  
with a flash reducer (9),
  - which is arranged on the end of barrel (1) on the muzzle side,
  - which has, on one end, a cylindrical bore (15) adjacent to the muzzle of barrel (1), coaxial with its bore, whose diameter is greater than that of the barrel bore, and
  - an expanding bore (17) that extends from the end of the coaxial, cylindrical bore (15) to the other front end of flash reducer (9) and has gas outlet openings (19) in its wall,
  - and with a blank cartridge device (25) that can be pushed over the flash reducer (9) and attached to it or to barrel (1), which
    - has a block (29) having a narrowed blind hole (39) relative to the barrel bore and
    - a small and preferably nonlinear gas outlet channel,
    - in which the block (29) is lengthened rearward by an end connector (35) and can be made to engage in the coaxial, cylindrical bore (15) of the flash reducer (9),characterized by a compression spring (47) that acts between the flash reducer (9) and the blank cartridge device (25), which is compressed when the blank cartridge device (25) is attached and, when the blank cartridge device (25) is loosened, pushes it so far forward that the propellant gases escape from barrel (1) past the block, through the gas outlet openings (19) of the flash reducer (9).
2. Firearm according to Claim 1, characterized by the fact that on the free end of end connector (35), a seal (51) is arranged on its outside periphery for gastight engagement into the coaxial, cylindrical bore (15) of the flash reducer (9).
3. Firearm according to Claim 2, characterized by the fact that the seal has at least one piston ring-like sealing ring (51).
4. Firearm according to one of the Claims 1 to 3, characterized by the fact that when the blank cartridge device (25) is pushed onto the flash reducer (9), its rear end protrudes



above a shoulder or the rear end of the flash reducer (9) forming a shoulder, and that a locking device (53) that engages behind the shoulder is mounted on the rear end of blank cartridge device (25).

5. Firearm according to Claim 4, characterized by the fact that the locking device (53) is formed from a nonradial, transversely running blocking element (55).
6. Firearm according to Claim 5, characterized by the fact that the blocking element (55) is arranged to move in a transverse groove (57) of blank cartridge device (25) or its bushing (27), and that the blocking element (55) has a design (61) that protrudes above the outside contour of the blank cartridge device (25) or its bushing (27), preferably on the top, when the blocking element (55) is not completely secured.
7. Firearm according to Claim 6, characterized by the fact that the blocking element is designed as a detent (55), which is mounted to pivot on one end in the transverse groove (57), that the detent (55) is pressed into a mating surface with its free end by means of a detent spring (59), and that the design is formed as a handle (61) that fully enters transverse groove (57) when the detent (55) is fully secured.

