

DESCRIPTION**Drive and quick stop for a weapon with preferably
linear breech or ammunition feed**

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Various drives, such as external drives or self-drives, for weapon systems are known from the prior art. Electrical drives are frequently provided for external drives, and these then, for example, drive a chain. One
10 known chain drive is used in the machine gun known by the name Bushmaster or else chain gun. In this case, the times during which the breech has to be stationary for closing it, in order to fire the shot, in order to open the breech and to place a cartridge in front of
15 the breech, are implemented by a revolving chain which is driven by a motor ([http://de.wikipedia.org/wiki/M242 Bushmaster](http://de.wikipedia.org/wiki/M242_Bushmaster)). In this case, the breech, together with the round or cartridge in front of it, is fed linearly to the cartridge chamber.

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DE 10 2006 022 622 A1 describes a linear feed for the round into a weapon barrel or cartridge chamber, which feed has a control guide, which is used for function control, on the horizontal plane parallel to the
25 movement of a breech, which has to be guided linearly, for the breech-loading weapon. This functionally interacts with a so-called drive guide, which is likewise located on the horizontal plane, for guiding a means connected to the breech. The drive guide is
30 integrated in a movable slider, which is itself moved by a universally configurable drive. Furthermore, a locking guide is provided for locking the breech, and is preferably integrated in the movable slider together with the drive guide. A bolt on a locking ring, which
35 is preferably arranged on the weapon side, can engage in this locking guide. This bolt then itself moves the locking ring. Within the control guide and the drive guide, which interact with one another, a connecting rod

or the like is positively guided by the guides and the slider along these guides. The breech is moved backward and forward by means of this connecting rod.

5 Building on this, DE 10 2007 048 468.4, which was not published prior to this, considers in more detail a drive for the linear feed of the round into a weapon barrel or cartridge chamber by means of a chain. The chain itself is passed in a simple manner closely
10 around two sprocket wheels. A chain link or a stud on the chain is integrated in a guide or groove which is located underneath the movable slider. This allows the chain to continue to run during the times in which the weapon is stationary, and which are defined by the
15 function control. The chain itself can be driven by an electric motor.

Since, in the case of an external drive, the breech movements take place independently of the gas pressure
20 in the weapon barrel, it is necessary to prevent the breech from being opened in the event of a misfire (the propellant charge in the cartridge does not burn away after the firing energy has been supplied) or a late fire (in this case the propellant charge burns away
25 with a considerable time delay). In general, the gas pressure or the weapon barrel itself is for this purpose detected as an indication of correct burn-away. If this information is lacking, a so-called quick stop must be initiated, and the opening of the breech must
30 be prevented.

The mass forces during breaking of the external drive, in order to prevent opening, result in high loads in or on the elements of the drive train, particularly at
35 relatively high firing rates.

DE 10 2007 048 470.6, which was not published prior to this, deals with the problem of a so-called quick stop

in externally driven weapons. The quick stop is inserted all the time, and is moved out again when a shot is fired correctly. However, in the event of a misfire, a means which is functionally connected to the
5 weapon recoil runs onto the quick stop, the drive movement is stopped, and the breech is not unlocked, at least for a predeterminable time.

DE 30 21 200 C2 discloses a protection system against
10 late firing or subsequent firing. In addition to having a sensor for detection of recoil, the weapon is equipped with a quick stop which can be moved to a position pushed in with respect to the chain part, in order to stop a normally continuously moving chain
15 part, and therefore to stop the movement of the breech. A locking apparatus which responds to the sensor controls the movement of the stopping apparatus between the pushed-in position, in which the chain part is stopped, and an extended position, in which the
20 movement of the chain part is otherwise not impeded. The protection system has two elements, which are connected to the chain part, a main element and a safety element, as well as a trigger rod which is controlled by a solenoid, and a recoil push rod. The
25 recoil push rod is used to release a recoil catch bolt when the shot is fired, the trigger rod is used to move the safety element down when the weapon is locked and to release it when the round has been correctly fired. In order to subsequently stop the weapon, the trigger
30 rod acts on the main element, since the solenoid is switched off. However, an electrically controlled solenoid such as this is particularly undesirable in safety devices of this type because it is itself susceptible to defects. The possibility of the material
35 of the rods fracturing furthermore means that the safety device is not functionally reliable. In addition, the design of the entire unit is very complex.

DE 32 18 550 C2 discloses a blocking device for a machine gun having an externally driven breech drive. In this case, energy which results from the shot firing is used for a shot monitoring device to interrupt the external power supply. When a shot is not fired and there is no return movement, this prevents a control stud of the device from being moved out of a pulled-back position to a driving position, while a switching lever is transported by an interrupter stud to a position in which the power supply is continuously restricted. The disadvantage of this solution is likewise the high level of design complexity, and the weight associated with this.

DE 10 2007 054 470.9, which was not published previously, deals with a drive for a weapon with a linear round feed, which is distinguished in that the linear feeding of a breech to the weapon barrel or cartridge chamber is achieved by means of a linear guide groove in drive kinematics. A driver is guided in the guide groove and is physically connected to the breech. The guide groove is surrounded by a circumferential positive guide (slotted guide) which itself interprets the necessary times during which the breech is stationary during locking, firing, unlocking in its front position and reloading. A further means is guided within the positive guide, as a drive means for the breech. The drive can be transmitted by sliding rollers, gear wheels or the like, which are driven by a motor etc. The drive itself continues to run during the times when the weapon is stationary, while the breech is moved out and back in again later during the times in which it is stationary. A slider is integrated between the drive means and the driver, and releases the driver from the breech. For this purpose, a slider has a slide cam, along which the driver is guided and is raised.

The purpose of the invention is to specify a drive for feeding the weapon breech to the cartridge chamber, in which the breech is automatically decoupled from the drive, particularly in the event of a misfire or a late fire.

The object is achieved by the features of patent claim 1. Advantageous embodiments are listed in the dependent claims.

In an application that was submitted in parallel, a drive is proposed with a quick stop device with a chain to which at least two driver studs are fitted. The chain is passed around at least two sprocket wheels, and is preferably arranged underneath the breech. A slide is mounted in a guide at the bottom on the breech/breech support such that it can move transversely with respect to the firing direction, and a groove extends over the entire width of this slide. The respective driver stud moves the breech via this groove, forward in the firing direction or backward after the shot. The times during which the breech is stationary in the front limit position are implemented in that the driver stud which transports the breech forward is moved out of the groove and is moved backward on the other weapon side without the breech. When a shot is fired, the slide is then moved to the other weapon side, while it remains in its position in which it has been moved away from the driver stud when the shot is not fired, as a result of which no further driver stud can drive the breech to the rear.

The present invention is based on the idea of integrating two chains which run in opposite senses as a drive. The rotary movement of the external drive, for example an electric motor, is converted via this chain

drive to a forward and backward movement of a breech/breech support.

5 The axes of the sprocket wheels are preferably transverse with respect to the firing direction, and are in this case preferably underneath the breech. One of the chains moves the breech forward, and the other moves it backward. In practice, the breech is moved forward by one of the two chains on the left-hand side
10 of the weapon, while the other chain drives the breech backward on the right-hand side of the weapon (or vice versa).

15 In order to allow the breech to be stationary for times in the limit positions, the breech is disconnected from the drive in its front and rear positions. This can be done by decoupling the driver studs of the drive from the breech. In one preferred embodiment, in order to move the breech, these driver studs engage in a slide
20 which is located underneath the breech and can be moved transversely with respect to the firing direction. In its left-hand position, the slide functionally engages with the driver on one of its (left-hand) chains, and in its right-hand position it functionally engages with
25 the driver on the other (right-hand) chain. During the times when the breech is stationary, the driver studs each leave the slide when the latter has assumed its central position. In this central position, the slide and therefore the breech are disconnected from both
30 chains.

When the right-hand chain has driven the breech forward, the slide is moved to its central position by a control stud, which follows the driver, on the right-
35 hand chain, and in the process is disconnected from the drive. In this position, the breech is locked, the cartridge is fired, and the weapon recoils. By means of this recoil (it is also possible to use gas pressure),

the slide is moved to the left-hand (other) side of the weapon or breech, from where the slide can be driven backward by the left-hand chain via the driver stud on this chain.

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When a shot is fired correctly, the breech is moved by the second chain to the rear position. Here, the slide is once again shifted or moved to its central position by the control stud on the second chain, and is
10 disconnected from the drive for the rear waiting time of the breech. Whilst the next cartridge has been placed in front of the breech, the slide is pushed to the other (right-hand) side by an element, for example a feeder. The driver stud on the first (right-hand)
15 chain now moves from underneath into the groove in the slide, and once again drives the breech forward.

In contrast, if the cartridge does not fire, the slide is not moved to the left because there is no weapon
20 recoil, but it remains in its central position. The breech cannot be unlocked and also cannot be driven back.

The invention will be explained in more detail using
25 one exemplary embodiment and with reference to the drawing, in which:

Figure 1 shows an illustration of a breech drive with chains and sprocket wheels arranged
30 underneath a breech, from a rear perspective,

Figure 2 shows a front view of the breech drive from figure 1,

35 Figure 3 shows the major assemblies for moving a slide which is integrated in the breech drive (seen from the right in the firing direction),

Figure 4 shows the assemblies from figure 3, illustrated in a transparent form (seen from the left in the firing direction),

- 5 Figure 5 shows the breech drive, as seen in the opposite direction to the firing direction.

Figure 1 shows an illustration of a breech drive with two chains 6, on the right and left, seen in the firing
10 direction, for an externally driven machine gun (weapon). A weapon barrel 1 is mounted in a barrel lock 2 (in this case a locking bush), in which a breech 3 is also locked in its front position. The breech 3 can be moved on breech guides 4 in the direction of the weapon
15 barrel axis.

Sprocket wheels 5 and the two chains 6 are preferably arranged underneath the breech 3 or the breech guides 4, or some other breech support. The drive is provided
20 via a bevel gear 9, which rotates two pinion shafts 10. The bevel gear 9 is driven by a motor or a drive of this kind (not illustrated in any more detail) (directly or indirectly by transmission means), and sets the two chains 6 in motion by means of the pinion
25 shafts 10 and the two rear sprocket wheels 5, such that the latter rotate in opposite senses. The upper strand of the chain 6 is moved in the firing direction on the right-hand side of the weapon, and it is moved in the opposite direction on the left-hand side of the weapon.
30 Both chains 6 each have a driver stud 7 and a control stud 8.

Figure 2 shows a slide 11 which is mounted on two guide bolts at the bottom on the breech 3, such that it can
35 be moved transversely with respect to the firing direction. A groove 12 is located in the slide 11, in which groove 12 the driver studs 7 on the chains 6

engage, in order to drive the breech 3 forward and backward in the firing direction.

5 In order to transport the breech 3 forward, the driver stud 7 on the right-hand chain 6 engages in the groove 12, with the slide 11 located in its right-hand position. This results in an interlocking connection, in the longitudinal direction of the weapon, between the drive and the breech 3, with the breech 3 being
10 accelerated and braked via a sinusoidal function, which is predetermined by the radius of the sprocket wheels 5.

15 The times in which the breech 3 is stationary in the front limit position are implemented in that the driver stud 7 on the right-hand chain 6 travels downward out of the groove 12 in the slide 11, while the slide 11 is at the same time moved to its central position via its run-on ramp 13 by means of the control stud 8 on the
20 same chain 6. The upper web of a holder 14 which is fixed to the weapon housing is therefore located in the groove 12, by which means the breech 3 is connected, when in its front position, in an interlocking manner to the weapon housing. In this position, the slide 11
25 does not engage with the driver stud 7 either on the right-hand or on the left-hand chain 6.

In order to secure the slide 11 against inadvertent movement when in the right-hand, left-hand and central
30 positions, in one simple variant, inclined surfaces on the underneath of the bolt 18 grip against surfaces 19, which are arranged parallel, on the slide 11. In this case, a spring permanently presses the bolt 18 against the surface 19, and therefore ensures that the slide 11
35 can be moved transversely with respect to the breech 3 only against a correspondingly high force.

When the breech 3 is in the front, locked position, a firing bolt (not illustrated in any more detail) is released, by which means a shot is fired. Weapon recoil then occurs, and can be used to move the slide 11 to its left-hand position. Alternatively, a build-up of gas pressure can also be used.

The lever 15 which is used for this function should be considered as an example. This function could also be carried out in a different manner, for example by using the gas pressure instead of the weapon recoil, or by an intermediate buffer spring. The latter could better tolerate weapon recoils of different length.

In figure 3, the lever 15 is rotated during weapon recoil by the stud 21 (figure 2) on the barrel lock 2, and its wedge-shaped tab 16 moves the slide 11 by its chamfer 20 (figure 4) to its left-hand position.

Figure 5 shows this position, seen in the opposite direction to the firing direction (with minor discrepancies in the correct position of the driver and control studs 7, 8). In order to ensure that the breech 3 remains locked in its front position until the start of its rearward movement, a locking catch 17 is arranged on the holder 14 such that it can pivot. The locking catch 17 engages in the groove 12 in the slide 11, and thus holds the breech 3 in its position.

The driver stud 7 on the left-hand chain 6 then enters the groove 12 in the slide 11 from underneath, with the locking catch 17 being pushed out of the groove 12, allowing the breech 3 to be moved to its rear position in the opposite direction to the firing direction. In the rear position, the driver stud 7 on the left-hand chain 6 leaves the groove 12 in the slide 11, while the control stud 8 on the same chain 6 moves the slide back to its central position. In the rear position as well,

a holder which is not illustrated in any more detail is provided and in this position connects the breech 3 to the weapon housing in an interlocking manner.

- 5 After a new cartridge has been fed, a lever, for example of a feeder, moves the slide 11 to the right-hand side of the weapon, as a result of which the driver stud 7 on the real chain 6 drives the breech 3 forward again.

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However, if no shot is fired, the slide 11 remains in its central position when this is forward. Since, in this position, the slide 11 is not engaged with the driver stud 7 on either the right-hand or on the left-
15 hand chain 6, unlocking cannot take place, and the breech 3 cannot be transported further to its rear position.

It is self-evident that it is also possible to use two
20 motors as autonomous drives for the right-hand and left-hand chains 6, within the scope of the inventive idea. This requires synchronization of the two motors and the slight impression that the entire drive unit is physically larger.

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PATENT CLAIMS

1. A drive with a quick stop device for a breech (3) or breech support which can be moved in the axial direction with respect to a weapon barrel (1), having
- at least one motor or the like,
 - two chains (6) which run in opposite senses,
 - sprocket wheels (5) around which the chains (6) are passed,
 - 10 - driver studs (7) and control studs (8) which are integrated on the chain (6),
 - a slide (11), which is mounted on two guide bolts at the bottom on the breech (3) such that it can be moved transversely with respect to the firing direction, with
 - 15 - a groove (12) being located in the slide (11), in which groove (12) the driver studs (7) on the respective chains (6) engage, in order to drive the breech (3) forward and backward in the firing direction,
 - 20 - the times in which the breech (3) is stationary in the front limit position are implemented in that the driver stud (7) which transports the breech (3) forward is moved out of the groove (12), while
 - 25 the slide (11) is at the same time moved to its central position via its run-on ramp (13) by means of the control stud (8) on the same chain (6), and
 - when a shot has been fired, the slide (11) is moved from the central position to the other
 - 30 weapon side, while it remains in its central position when no shot has been fired, such that none of the driver studs (7) can drive the breech (3) to the rear.
- 35 2. The drive as claimed in claim 1, characterized in that a bevel gear (9) rotates two pinion shafts (10), with the bevel gear (9) being driven by the motor or the like and the two chains (6) being set

in motion via the two preferably rear sprocket wheels (5) such that the latter rotate in opposite senses.

- 5 3. The drive as claimed in claim 1 or 2, characterized in that, when the slide (11) is in the central position, an upper web of a holder (14) which is fixed to the weapon housing is located in the groove (12) in the slide (11), by
10 which means the breech (3) is connected in an interlocking manner to the weapon housing.
4. The drive as claimed in one of claims 1 to 3, characterized in that a lever (15) is rotated by a
15 stud (21) of a barrel lock (2) during weapon recoil, by which means the slide (11) is guided to its left-hand position, along its chamfer (20), by means of a tab (16), which is in the form of a wedge, on the lever (15).
- 20 5. The drive as claimed in one of claims 3 or 4, characterized in that, until the start of its rearward movement, the breech (3) remains locked in its forward position and, during loading, in
25 the rear position, for which purpose a locking catch (17) is arranged such that it can pivot on the holder (14), engages in the groove (12) in the slide (11), and thus holds the breech (3) in its position.
- 30 6. The drive as claimed in claim 5, characterized in that the corresponding driver stud (7) on the chains (6) preferably runs from underneath into the groove (12) in the slide (11), with the
35 locking catch (17) being forced out of the groove (12) and releasing the breech (3) for transport.