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## Locked Semi-Automatic Firearm

The invention concerns a locked semi-automatic firearm with a rigid barrel with a cartridge chamber, a lock head that is lockable with respect to the barrel, and a lock mount that is moveable relative to the lock head, on which a recoil spring is mounted, whereby an additional, powerful spring mechanism is arranged between the lock mount and the lock head, via which the heavy lock mount is supported on the latter when the lock head is locked. (Preamble of claim 1).

Position designations, like "above" refer in this document only to the normal fire position of the semi-automatic firearm in the horizontal direction of fire, which run "forward."

Semi-automatic firearms with sensitive cartridge cases, in particular semi-automatic shot guns, have always been problematic, in particular due to the extremely low shelf life of the cartridges vis-à-vis residual pressure when loading the weapon. With semi-automatic shot guns, it is also the case that the cartridges with exactly the same measurements can have very different payloads, which in turn make for different residual pressures.

Incidentally, the lock on many semi-automatic weapons tends to already open when the bullet is still in the barrel or the gas pressure has not fallen enough.

With a semi-automatic weapon, like a shot gun or a semi-automatic pistol designed for strong cartridges and/or a or long-barreled pistol, a low residual pressure would already cause most

cartridge shells to inflate or burst when the lock is opened. Such residual pressure is unavoidable in a simple semi-automatic pistol with a blow-back lock. But locked recoil loaders also have residual pressure when opening that is no match for some small-shot cartridge shells when the lock is opened. Recoil-loading semi-automatic rifles, which are made for weak cartridges, also have problems with stronger munitions as a rule, which can be attributed to the increased residual pressure.

Shot-gun cartridge shells were already made entirely of metal. However, due to the high price and weight, they were not generally accepted.

An additional problem is the low tensile-loaded capacity of a shot-gun cartridge shell in its longitudinal direction. With cheap shot-gun cartridge shells made of cardboard with metal bottoms, this causes the metal bottom in the cartridge chamber to separate from the rest of the shell. The low conicity of shot-gun cartridges supports this tendency.

For approximately 100 years, shot guns have used a recoil-loading system in which the barrel and the closed lock first run back over the full return range and the pressure was almost completely dissipated in the process (Browning, Walther). Then the lock remains fixed in the backmost position and the barrel is decelerated under the power of a spring and is lead relatively slowly towards the front. Together with the lock, the cartridge shell also remains stationary, so that it is extracted gently from the barrel. Thus, excessive thrusts do not occur in the cartridge shell. After the ejection of the cartridge shell, the lock snaps forward again under the effect of the recoil spring and takes a new cartridge with it in the process.

Such a shot gun is very reliable – even with differently loaded munitions. But, it has two different disadvantages:

- a built-in brake, which can slow the movement of the barrel and perform an adjustment for extreme loading differences, only works under strictly defined conditions (for example, only when the components are slightly oiled), and
- the relatively slow, powerful backwards movement of the barrel requires support from the housing. This takes place in that the weapon is pressed into the shoulder of the shooter. However, if the weapon is shot from the hip, then this support is omitted and this can lead to serious loading malfunctions.

Such a system is therefore not suitable for shot guns that are used for military and police use.

Of late, the tendency has been to switch to gas pressure loaders for shot guns. Gas pressure loaders have long been used in semi-automatic rifles and have proven themselves there. But, semi-automatic shot guns require a defined gas pressure and an easily removable resistant shot cartridge shell. With modern, powerful cartridges that have a cartridge floor made of metal with a long sleeve and a shell body made of longitudinally ribbed plastic, such gas-through-loader shot guns function trouble-free. However, compared to poor quality cartridges, they do not have the modesty of recoil-loading shot guns. Thus, the gas pressure loader functions the same when fired from the hip or from the shoulder.

However, the gas pressure loaders are very complicated. Depending on the powder used, they require different levels of cleaning and are susceptible to dirt, rust, and lack of oil due to the many

metal-on-metal contact areas. Cutting down on gas pistons by loading the lock with drawn-off powder gases leads to structural simplification but increased danger of contamination.

Modern recoil loaders are also known that manage without movement of the barrel (e.g. weapon G3) - but this at a cost to the insensitivity with respect to munitions. In other words, such recoil loading weapons, in particular these types of shot guns, are very sensitive as far as munitions are concerned.

Now, a semi-automatic weapon, in particular a semi-automatic shot gun that is simple, robust and undemanding with respect to munitions, would be universally useful: it could be used as a hunting weapon even in underdeveloped areas where one relies on various munitions; moreover, as a valuable police or military weapon, as emergency armament in military airplanes, etc., i.e. in particular:

- where the weapon is used after longer period of non-use, without being able to be subjected to prior examination and cleaning,
- where one cannot be picky with respect to munitions,
- where the costs of the weapon cannot be too high.

Indeed, another recoil-loading system that is locked but still has a rigid barrel is also known for shot guns. This system is described in US 4 604 942 and has a lock mount seated loosely in the weapon that remains in position due to its mass inertia while all other parts of the weapon run backwards due to the recoil. The lock mount and the lock head are designed such that they move towards and eventually hit each other.

Indeed, the seemingly simple weapon is in fact very complicated. Moreover, the recoil loading system does not seem to function safely, as a weapon that came to market with this system is no longer offered. This system was later combined with a pump gun mechanism, whereby the semi-automatic activity can be optionally switched off (Benelli Super M 3). These known weapons have a tube magazine, which does not make sense for an issued weapon.

Based on this problematic situation, the goal of the invention is to find a new type of semi-automatic handheld firearm that at least partially avoids the above disadvantages of the recoil and gas pressure loaders.

In particular, a simple, inexpensive semi-automatic handheld firearm that can be produced with unusually high tolerances is to be found that is particularly insensitive with respect to its munitions.

This goal is achieved in accordance with the invention in that, as with the aforementioned class of semi-automatic handheld firearms, a powerful spring mechanism is arranged between the lock mount and the lock, via which the (heavy) lock mount is supported on the latter when the lock head is locked. Besides the spring mechanism, there is no impact between the lock head and the lock mount, so that the initial relative movement between these parts is not limited by an impact (claim 1).

When the lock head is locked with respect to the barrel, then the weapon is locked. The locking is, as usual, only unlockable if the lock mount moves backwards a bit from this position. The lock mount, which moves further backwards, now takes the lock head back with it. During the

subsequent, also common forwards movement of the lock mount and head, a cartridge is inserted into the cartridge chamber. The lock head hits the bottom of the cartridge or the cartridge chamber and comes to a stop. The lock mount unlocking on the lock head locks the lock head with respect to the barrel and then comes to a stop.

This is the progression of movement with a common recoil loader with a rigid barrel and also the progression of movement when loading the weapon in accordance with the invention. However, while with all common semi-automatic weapons the lock mount is pressed by the recoil spring against a fixed impact, usually against the lock head, if the lock mount for the invention is not affixed to the lock head. Rather, it is supported on this via a powerful spring mechanism, but can, as a rule, be moved forward without causing an impact. The coordination of the lock spring and the spring mechanism thereby determines the position that the lock mount finally takes on. Broad tolerances are possible and allowed here.

Incidentally, if we are talking about "the" lock spring here, then a lock spring mechanism is meant that can also consist of several springs.

During a shot (from the shoulder or from the hip), the weapon performs a short, powerful backwards movement that is felt by the shooter as a recoil. All parts that are then stationary with respect to the weapon as a complete entity, i.e. the stationary barrel and also the locked lock head, also follow this recoil movement.

With the weapon in accordance with the invention, the lock mount of the recoil movement does

not follow, but rather remains in its absolute position as a result of its mass inertia, which is contrary to common practice. This means that, as a result of the recoil, the barrel and the lock head move backwards relative to the lock mount, as it were, against the power of the strong spring mechanism; as the case may be, supported by the much weaker lock springs. As seen from the barrel, the barrel and the lock head remain stationary. The lock mount moves forward relative to this and is restricted by the spring mechanism.

The stronger the cartridge, the stronger the recoil, i.e. the backwards acceleration of the barrel and the parts of the weapon that are rigidly connected with it press together the spring mechanism between the lock head and the lock mount in a correspondingly strong manner so that the lock mount moves forward all the more relative to the lock head.

In this connection, we expressly point out that the spring mechanism works directly or indirectly between the lock mount and the lock head and can then be supported by any other part of the weapon that can be made stationary with the lock head.

The described process of the relative movement between the lock head and the lock mount first comes to a stop when equilibrium has been created between the spring mechanism on one hand and the inertia of the lock mount on the other hand, supported as the case may be by the power of the recoil spring. The path of movement is thus rather short, since:

- the shoulders or the arms of the shooter strive to counterbalance the recoil of the weapon, and
- the recoil effect of the fired cartridge on the weapon (mainly) ends at the latest when the bullet

or the shot has left the barrel. (With a shot gun, the share of the recoil is relatively low due to gases that flow out forwards behind the shot charge or the bullet.)

After the stop of the relative movement, the compressed spring mechanism begins to expand again and accelerates the lock mount against the power of the recoil spring backwards in a powerful manner. In the course of its backwards movement, the lock mount unlocks the lock head from the barrel and then also takes it forward. This completes an opening cycle of the loading movements.

As mentioned above, due to the lack of an impact with a stronger cartridge, the relative movement of the lock mount forwards and over the locking position is relatively more pronounced than with a weak cartridge. The unlocking of the weapon thus requires more time with a strong cartridge than with a weak cartridge. Since a slower decrease in gas pressure is expected with a stronger cartridge than with a weaker cartridge, there is more time available for this drop in gas pressure.

The more strongly compressed spring mechanism throws the lock mount backwards in a more powerful manner than a spring mechanism compressed only weakly by a weak cartridge. Thus, with a strong cartridge, the lock mount and also the opening of the lock head and the extraction of the cartridge shell will occur more rapidly than with a weak cartridge. With shot cartridges, this is harmless in and of itself, since the stronger shot cartridges are also more modern cartridges that better withstand the stress than weaker cartridges with cardboard shell jackets. But when exceeding or falling short of a specific speed range of the lock mount, the speed framework is abandoned in

that on one hand we can count on a secure locking function and on the other hand on reliable extraction. As the case may be, the durability of the weapon is even endangered.

A particularly intense opening of the lock can be expected when the spring mechanism is completely compressed beforehand so that the channels of the spring, in particular the spiral spring, sit on top of each other. Then the opening speed can be increased in an unexpected manner. Additionally, parasitic oscillations can overlay and disrupt the system. The durability of the weapon is also a critical characteristic here.

In order to avoid such disruptions and comply with the targeted speed range to the greatest extent possible, it is further recommended in accordance with the invention that the spring mechanism of the compression counterbalances progressively increasing power (claim 2).

The lower limit of the named speed range and thus the design of the spring is selected such that a reliable function can still be counted on with weak cartridges and contamination. Now the power of the spring mechanism does not increase linearly with stress but rather progressively and as it were in such a degree that the spring mechanism cannot be compressed very much more even with the firing of the strongest cartridges.

An optimized spring characteristic can for example be attained through a type of disk spring stack. However, it is cheaper and easier to equip the spring mechanism with a powerful spring with a mainly linear power/path characteristic and additionally provide a buffer arrangement that are then loaded after the spring has been partially compressed (claim 3). The spring and the

buffer mechanism can thereby be coordinated so that only the spring is strained and expands again when firing weak cartridges, when firing a stronger cartridge on the other hand also the buffer mechanism. The buffer mechanism can guarantee the desired, progressive behavior with simple means.

A buffer mechanism made of at least one batch of elastomer buffers with large hysteresis has proven to be optimal (claim 4). The batch mechanism ensures that the buffer mechanism can be adjusted for strong cartridges. Furthermore, elastomer buffers tend to avoid stress transversally under pressure and thus increase their diameter. But, the measurement of the diameter increase is a function of the length of the buffer so that several stacked short buffers increase less in diameter than a single, longer buffer.

The hysteresis is particularly important. It has the effect that not all introduced power is fed back to the lock mount, as with a spring. Hysteresis-afflicted buffers ensure a decrease and phase shift of the fed-back spring power. Thus, it is finally possible to reliably comply with the aforementioned speed range, within which the lock can function without incident, even for the strongest cartridges.

It is thus possible, for example, to fire without incident 12-caliber mixed cartridges, i.e. such different shell lengths, ca. 70-mm- and 76-mm-long cartridges. Through the simple adjustment of the spring and the buffer device, cartridges of the caliber 12/65 or 12/89 can also be fired in a mixed manner if this should not otherwise be possible with a standard calibration.

In a common semi-automatic weapon with lock head and lock mount, the lock mount moves backwards when being unlocked, while the lock head still remains stationary. The striker thereby remains seated in the lock mount so that the striker can first reach the detonator cap of a cartridge when the weapon is already at least mainly locked. In order to also prevent this, the weapon in accordance with the invention has a connecting link

- that is supported in the locked state on the lock head,
- via which the spring mechanism is supported on the lock head, and
- that is transported by the lock mount during its recoil so that the unlocked lock head is no longer directly burdened by the spring mechanism at least right after unlocking.

(Claim 5).

Furthermore, it is suggested in accordance with the invention that the striker is directly attached to the lock head (claim 6).

Incidentally, the cartridge could also be fired when the lock head is still lying on the cartridge, regardless whether the lock is now locked or unlocked.

In order to prevent this, it is suggested in a further embodiment of the invention that a locking block that is freely implemented in a locked position by the striker is attached to the lock head and that it blocks the striker in a secluded, inoperative position in an unlocked position (claim 7). The locking block thereby functions more or less like a safety, as the trigger can only fire the cartridge when the lock head is locked.

This embodiment of the invention is improved even further in that the locking block has a taper with which it places the striker in the inoperative position during the transition from the locked to the unlocked position (claim 8). For example, if the striker gets stuck in the detonator cap as a result of a cartridge error, then it is disengaged from the locking block by its movement during unlocking and is placed in an inoperative position.

In accordance with a further, preferred embodiment of the invention, this locking block can be moved into and out of the locked position transversely to the bore axis in the lock head. Moreover, it goes through the lock head and in the locked position engages in a recess in a component that designed as one piece together with the barrel or is affixed to it (claim 9). The engagement preferably takes place at three locations that are distributed approximately equidistantly over the perimeter. Particularly with a shot gun, a generous over-dimensioning of the recess and the locking bolt is possible due to the cartridge size. The locking bolt is preferably slightly beveled in the section that reaches into the recess so that a gentle locking (above all at high housing tolerances) and unlocking is always possible.

The lock mount can be designed in a longitudinally moveable manner on the lock head side opposite the recess. The locking block thereby has a front and a rear base board and the lock mount a front and a rear driving rod of the type that

- with advanced recoil, the front driving rod of the backwards moving lock mount hits the front base board of the locking block in order to pull it out of the recess and

- and, with its closing movement, the rear driving rod of the lock mount hits the rear base board of the locking block in order to press it into the recess, whereby at least one each of the front or rear base boards and driving rods are beveled.

When the lock head is locked, then the lock mount can be moved freely over the position that it takes on after locking is complete. If the lock mount moves backwards from this position, then it pulls the locking block out of the recesses after covering a more or less large play distance and then takes the lock head with it. The size of the play between the base boards of the locking block and the driving rods of the lock heads is not important. It is only important that the base boards fit in the opening between the driving rods in the lock mount.

Thus, a simple and less exact production is possible; inexact parts or spare parts can be installed without further adjustment.

The weapon in accordance with the invention can, for example, be used for long-barreled machine pistols or for semi-automatic rifles. In particular, the system in accordance with the invention is suitable for a semi-automatic shot gun (claim 11). Through suitable adjustment of power and the design of the spring device and the dimensions of the lock mount, a specialist can create a semi-automatic shot gun that processes various types of munitions without incident but that only requires a small portion of the production costs of other semi-automatic shot guns.

The subject matter of the invention is explained in greater detail using an embodiment example and the attached schematic drawing. The example shows:

- Figure 1        a longitudinal section through the rear part of the barrel piece and the lock of a shot gun in accordance with the invention with a closed and locked lock;
- Figure 2        a section as in Figure 1, but with an unlocked lock and right after the firing of a bullet;
- Figure 3.1      a longitudinal section through the lock mount in a slightly larger scale than that used in Figures 1 and 2;
- Figure 3.2      a perspective view slanted from above of the lock mount shown in Figure 3.1;
- Figure 4        a cross-section through the rear part (end section) of the barrel piece along the center axis of a locking recess;
- Figure 4a       the item in Figure 4, enlarged and seen transversely to the longitudinal direction of the weapon;
- Figure 5.1      a view of the locking block from behind;
- Figure 5.2      a side view of the locking block;
- Figure 6        a view of the lock approx. in the state shown in Figure 1, slanted from above;
- Figure 7        a greatly enlarged extractor claw; and

Figure 8 a side view of the dismantle block;

Figure 9 a section along the line IX – IX through the dismantle block from Figure 8.

The drawing shows a complete embodiment example of the invention. The following therefore only refers to individual figures when the location of a specific element/characteristic is hereby made easier.

The only partially shown weapon is a semi-automatic shot gun that can be provided with a case magazine (Figures 1, 2). The shot gun has a barrel piece 1 with a center axis or a bore axis 37. In the rear part of this barrel piece, a cartridge chamber 3 is depicted onto which towards the back an end section 4 of the barrel piece 1 connects. The end section 4 has an almost U-shaped cross-section (Figure 4) open on the bottom and has a concentric, upper locking recess 5 and on the bottom two locking notches 6. The latter sit in the free ends of the two legs of the U cross-section. A cannellure 10 running parallel to the bore axis 37, in each of which one cartridge extractor 61 (Figure 6) can run, is provided at approx. half the height of each U-leg.

The cartridge chamber 3 of a weapon that is ready to fire is locked by a lock head 11 towards the back. This is penetrated by a front vertical transverse drill hole that in turn takes in a locking block 25. This locking block has an upside-down T-shaped cross-section diagonal to the bore axis (Figure 5); with a conical locking appendage 7 on the free (upper) end of the center shaft and one locking finger 8 on each of the two ends of the (lower) transverse shaft.

In the locked position, the locking appendage 7 engages with the locking recess 5 and the locking finger 8 simultaneously engages with the locking notches 6.

All engagement surfaces are sloped with respect to the vertical line in order to enable the effortless creation and detachment of the engagement of the locking block 25 in the end section 4 of the barrel piece 1. But, the sloped angle of the surfaces are so low that the engagement is self-blocking, i.e. it cannot be opened through a force on the lock head 11 along the bore axis 37 towards the back.

Barrel piece 1 and lock head 11 are thereby directly connected with each other during a shot and transfer the high initial forces directly to each other. No other element is affected by the transfer of power. The barrel piece 1 can therefore be embedded with its back end into a plastic housing 2. Namely, the largest occurring forces are not discharged into the housing 2.

The lock head 11 sits on a lock mount 13 (Figures 3.1 and 3.2). This can be moved a certain distance longitudinally relative to the lock head 11. The lock mount 13 has a longitudinal recess 25, a transverse recess in the area below the locking block 25, and level surface 59 behind this.

Each transverse recess 53 is bordered on both sides of the longitudinal recess 54 by a nose 55 that flanges up and back and tops the level surface 59.

The locking block 25 is designed such that, in its upper locking position, the lower surface of its

transverse shaft is rounded off almost flush with the lower surface of the lock head 11 (Figure 1). In this position, the lock mount 13 can move forwards and backwards under the locking block 25 and the lock head 11 and the locking block 25 can thereby glide on the level surfaces 59 of the lock mount 13.

However, if the lock mount 13 moves backwards over the resting position shown in Figure 1, then both noses 55 detect with their rear edges the transverse shaft of the locking block 25 and then pull it down into the transverse recess 53. This position is shown in Figure 2. In it, the lock block 25 disengages from the end section 4 of the barrel piece 1. The lock head 11 can now move backwards relative to the barrel piece 1.

With a further backward movement, the unlocked lock head 11 runs in a guide (not shown) in housing 2 such that the locking block 25 cannot move upwards.

When closing the lock head 11, this hits the rear end of the cartridge chamber 3. The lock mount 13 is then pulled or pushed further forward by a recoil spring 9 (only referred to schematically as the direction of force). In this process, one taper 57 forming the back wall of the transverse recess 53 stresses the locking block 25 in the upwards direction until finally the level surface 59 reaches under the locking block 25 and the position of Figure 1 is reached once again.

In the lock head 11, a pivotable dismantle block 27, which is held in its position of use by a bosh 28, is arranged behind the locking block 25 and approx. parallel to its center shaft (Figures 1, 2,

6, and 8, 9). The dismantle block 27 is taken up in a rear, vertical transverse bore hole 23 in the lock head 11. The bosh 28 can be disengaged by the bore hole 24 in the lock head 11 (Figure 6).

The lock block 25 and the dismantle block 27 are penetrated by a striker 19 and each have a bore hole 31 and 34.

The lower end of the dismantle block 27 is designed like a hammer foot 51 that runs in a groove 49 open on the top with upside-down T-shaped cross-section in the lock mount 13. In the operational state, i.e. in the position of use, in which the hammer foot 51 reaches below the flanks of the groove 49 and the dismantle block 27 is held by its bosh 28, an outlet 35 of the striker 19 hits a protrusion 36 located behind it in the bore hole of the dismantle block 27. This prevents the striker 19 in the position of use from falling backwards out of the lock head 11. If the dismantle block 27 is rotated by approx. an eighth of a turn after overcoming the bosh 28, then the striker 19 can be removed towards the back. Since in this state the hammer foot 51 still reaches under the upper flanks of the groove 49, the lock head 11 and the lock mount 13 still remain assembled, while an exchange of the striker 19 can be performed. Only a full quarter turn of the dismantle block 27 (only possible after removing the striker 19) releases the hammer foot 51 of the groove 49 and the lock head 11 can be lifted from the lock mount 13.

The bore hole 31 penetrated by the striker 19 in the locking block 25 is designed like an elongated hole that allows the locking block 25 to take up the positions in Figures 1 and 2 (locked and unlocked) despite the presence of the striker 19.

The striker 19 has a swelling 29 behind the elongated hole, while a recess 33 sloped complementary to the swelling 29 is formed in the bottom of the backside of the elongated hole 31. The recess 33 and the striker swelling 39 are formed such that the striker 19 can only be immersed in the elongated hole 29 when the locking block 25 is located in its uppermost position (locking position in Figure 1). In this position, the striker 19 can be inserted so far into the elongated hold 31 that its tip can stick out of the front surface of the lock head 11 for the firing of a cartridge.

If the locking block 25 is lowered, then the recess 33 presses the striker swelling 29 so far back due to its special form that the striker tip can no longer reach a cartridge. This ensures that a cartridge can only be fired if the lock head 11 is properly locked.

As described, swelling 29 and outlet 35 hold the striker 19 loosely between two final positions; the sloped recess 33 of the locking block forces a withdrawal of the striker 19 during unlocking. A striker spring is thus generally superfluous and therefore does not need to be provided.

A handle, for example a relocatable front shaft, could now be attached to the lock mount 13. An unlockable latch could place this handle in the foremost position. In this case, the recoil spring 9 naturally not required, but rather the handle and thus the lock mount are moved back and forth to load the weapon.

The provided example concerns a semi-automatic loader. The lock head 11 is hereby elongated

towards the back by a centric extension pipe 15, which receives and guides – also here – the elongated striker 19. The rear end of the lock mount 13 is extended upwards under the formation of a counter bearing 43.

At a distance from the counter bearing 43, an intermediate piece 39 is hung in front of this in the lock mount 13 from above so that it is held forward in the lock mount 13 by a step 40 but can be moved towards the back.

Counter bearing 43 and intermediate piece 39 each have a through hole that aligns them both and that is penetrated by the extension pipe 15. The extension pipe 15 serves as a support for a powerful pressure spring or opening spring 17, which are preferably designed as a helical bent wire spring and surrounds the extension pipe. The pressure spring 17 is supported in the relaxed state in the back and in front by the counter bearing 43 or the intermediate piece 39 (until the intermediate piece 39 sits on the step 40 of the lock mount 13).

This prevents a rattling (due to the back and forth movement of the pressure springs 17) when the lock is open.

As can be recognized, the powerful opening spring 17 has almost no effect. It only becomes operative when the lock head 11 moves backwards relative to the lock mount 13 in the locked position in Figure 1.

This type of movement actually occurs during firing: a backwards movement is forced on the barrel piece 1 and the lock head 11 locked with it, which seems to remain in position with respect to the heavy lock mount 13. This backwards movement does not need to have a large amplitude.

The compression of a shaft cap made of rubber that is supported e.g. against a wall is completely sufficient.

When one looks at the drawing, this actual movement is hard to imagine. Instead, one can assume that the lock mount 13 moves forward a bit during firing.

Now the following occurs: with this forward motion, the recoil springs 9 are insignificantly unburdened but in lieu thereof the opening springs 17 are stretched. The intermediate piece 39 and the counter bearing 43 thereby move towards each other. This movement stops depending on the strength of the recoil and then depending on the strength of the impulse of the fired cartridge.

If this movement comes to a stop through the compromising of the opening spring 17, then a counter movement is introduced, triggered by this compromised spring 17. In the course of this counter movement, the lock mount 13 is ripped powerfully backwards, whereby it, with its noses 55, pulls the locking block 25 downwards and then takes the lock head 11 with it with its further backwards movement. The rear end of the lock mount 13 thereby stretches the stop-cock of a known cut-off mechanism that is not depicted here and performs a loading movement. During the advance, the locking block 25 is pressed upwards again in the aforementioned manner and is support from underneath by the level, upper surface 59 of the lock mount 13. It does not matter whether or not the lock mount 13 is located one millimeter further forward. Thus, successive tolerances have no influence.

As already mentioned, the longer the – relative – advance of the lock mount 13 during firing, the stronger the recoil during firing. Correspondingly, the stronger the recoil, the more the opening

spring 17 is stretched. And, the more powerful the recoil of the entire lock 11, 13. In order to equalize this, additional shock absorbers are attached in the form of elastomer buffers 41. For this, two rods 45 parallel to the bore axis 37, which penetrate the counter bearing and are inserted into the recesses in the intermediate piece 39, are arranged on both sides of the center in the lock mount. These rods 45 penetrate the named elastomer buffers 41. A flange 47 on each rod 45 between the counter bearing 43 and the buffer 41 prevents the rod 45 from slipping backwards. The named recesses are open on the bottom for easy installation.

The elastomer buffers 41 are preferably comprised of several ring elements and are preferably made of a material with a high hysteresis. When a weak cartridge is fired, the elastomer buffers 41 are not or are only slightly compromised. But when a very strong cartridge is fired, then both elastomer buffers 41 are greatly compromised, whereby they give back less energy with their renewed expansion than they previously took up. The increased recoil energy of strong cartridges is thus at least partially destroyed – or, more exactly, converted into other forms of energy. The lock is hereby in the position to fire cartridges with very strongly varying recoil energy and thus muzzle energy without having to use a different locking spring 17 or without functional problems. A separate stop between the lock head 11 and the lock mount 13 is missing. Only the arrangement of the opening springs 17 and the elastomer buffer(s) 41 serves as the stop.

A further advantage of the depicted lock 11, 13 is that, in its unlocked state (Figure 2), the front surface of its lock mount 13 extends a little bit past the front surface of the lock head 11. Thus, a

cartridge can be forced upwards without its bottom getting caught on a cartridge extractor or e.g. on a projection of the front surface of the lock head 11. The thereby non-impacted lock head 11 also does not try to lock during transport.

As can be seen in Figure 6, the lock head 11 in this embodiment is unusual in that it has two opposite lying cartridge extractors 61. A larger version of such a cartridge extractor 61 is shown in Figure 7. As can be seen, it has a hook-like design with a hook surface 63 turned backwards that is designed to sit on the edge of a shot cartridge from the front. This edge is curved outward and forward so that the hook surface 63 sits on a curved version. Depending on whether cartridge extractor (not shown) is arranged on the left or the right, the cartridge shell is ejected on the left or the right. But it is important that no eccentric thrust or radial force that could come from an individual cartridge extractor 61 acts on the cartridge shell during ejection. This guarantees the proper ejection of very long cartridge shells. Only near the end of the recoil path of the lock, an eccentric force is exerted on the cartridge shell that causes its release first from one and then from the other cartridge extractor 61.

Otherwise, only the ejector needs to be converted for the conversion from right to left ejection. Both cartridge ejectors 61 remain where they are.

**Patent Claims**

1. Semi-automatic handheld firearm with a rigid barrel (1) with a cartridge chamber (3), a lock head (11) that is lockable with respect to the barrel (1), and a lock mount (13) that is moveable relative to the lock head (11), on which a recoil spring (9) is mounted, whereby  
an additional, powerful spring mechanism (17, 41) is arranged between the lock mount (13) and the lock head (11), via which the (heavy) lock mount (13) is supported on the latter when the lock head is locked, characterized in that the lock head (11) is supported by the spring mechanism (17, 41) without another end stop on the lock mount (13).
2. Semi-automatic weapon in accordance with claim 1, characterized in that the spring mechanism (17, 41) counterbalances its compression with a progressive, non-linearly increasing power.
3. Semi-automatic weapon in accordance with claim 2, characterized in that the spring mechanism (17, 41) has a powerful spring (17) and a buffer mechanism (41) parallel to this, whereby the spring (17) has a mainly linear nature and the buffer mechanism (41) is only then loaded after the spring (17) is partially compressed.
4. Semi-automatic weapon in accordance with claim 3, characterized in that the buffer mechanism (41) preferably consists of at least one batch elastomer buffers with large hysteresis.

5. A semi-automatic weapon in accordance with one of claims 1 through 4, characterized by an intermediate piece (39), via which the spring mechanism (17, 41) is supported in the locked state on the lock head (11).

6. Semi-automatic weapon in accordance with one of the previous claims, characterized in that the lock head (11) is transversed by a striker (19).

7. Semi-automatic weapon in accordance with claim 6, characterized in that the lock head (11) is transversed by a locking block (25) that is freely moveable by the striker (19) in a locking position and, in an unlocked position, blocks the striker (19) in a retracted, ineffective position.

8. Semi-automatic weapon in accordance with claim 7, characterized in that the locking block (25) has a tapered edge (33) with which, during the transition, it returns the striker (19) to its ineffective state from the locked into the unlocked position.

9. Semi-automatic weapon in accordance with the aforementioned claims, characterized in that the locking block (25) can be moved in and out of locked position transverse to the lock head (11) and inserts into a recess (5) in a component (4) that forms one piece with the barrel (1) or is attached to it when in the locked position.

10. Semi-automatic weapon in accordance with claim 9, characterized in that

- the locking block (25) has a base board (8) with a front and a rear guide surface and

- the lock mount (13)
  - on which the side of the lock head (11) facing the base board (8) is arranged,
  - has a front and a rear driving rod (55, 57) such that
  - with an advanced recoil, its front driving rod (55) hits the front guide surface of the base board (8) of the locking block (25) in order to pull the latter from the recess (5), and
  - with its closing movement, its rear driving rod (57) hits the rear guide surface of the base board (8) of the locking block (25), in order to press the latter into the recess (5) as well as the locking notches (6),
  - whereby at least one of each of the front or the rear base boards and driving rods (53, 55, 57, 59) is beveled.
- 11. Semi-automatic weapon in accordance with one of the previous claims, characterized in that it is a semi-automatic shot gun.