

Small arm having a locked breech

The invention relates to a small arm having a locked breech and such a breech itself (Generic part of Claim 1).

This breech exhibits a bolt head and a bolt head carrier.

This breech should build particularly small, but be capable of withstanding high recoils.

For this reason the breech exhibits a locking bolt, which can move transversal to the direction of motion of the breech and which interlocks with locking projections over a large area when in the locking position (Claim 1).

In particular the invention relates to a locked semi-automatic firearm with a rigid barrel with cartridge chamber, a bolt head which can be locked opposite the barrel and a bolt head carrier which can be moved relative to the bolt head, against said bolt head carrier which a breech-closing spring is supported, whereby between the bolt head carrier and the bolt head additional, powerful springs are arranged, via which the heavy bolt head carrier supports itself in the case of the bolt head being locked upon the latter (Generic part of Claim 2).

Positional terms such as "up" in this document always refer to the normal firing position of the semi-automatic firearm in the case of horizontal direction of firing, which runs to the "front".

Semi-automatic firearms with sensitive cartridge cases, in particular semi-automatic shotguns, have been problems; to be precise in particular due to the extremely

slight resistance of the cartridges to residual gas pressure in the loading of the weapon. In the case of semi-automatic shotguns there is an additional problem in that cartridges of one and the same dimension can have extremely variable charges, which in turn causes variable residual gas pressure readings.

In other respects many semi-automatic rifles have breeches that tend to open when the projectile is still in the barrel or the gas pressure has not yet sufficiently decreased.

In the case of a semi-automatic rifle such as a shotgun or a semi-automatic pistol equipped for large cartridges and/or long-barrel semi-automatic pistols a slight residual gas pressure would already cause most cartridge cases to blow up or burst when the breech opens. Such a residual gas pressure is unavoidable for example in a simple semi-automatic pistol with a blow back breech. However, even locked recoil-operated guns still have residual gas pressure when the breech opens which some shotgun cartridge cases wouldn't be a match for. Even recoil-operating semi-automatic rifles which are equipped for weak cartridges as a rule jam in the case of considerably larger ammunition, said jamming which can be attributed to the increased residual gas pressure.

It is true that shotgun cartridge cases have already been manufactured completely out of metal. However, due to the high price and weight these have not been successful in general.

A further problem is the slight tensile stress capacity of a shotgun cartridge case in its longitudinal direction. In the case of cheap shotgun cartridge cases made of cardboard with a metal base, this results in the metal base in the cartridge separating from the rest of the case. The low conical form of shotgun cartridges supports this tendency.

For about one hundred years a recoil-operated system has proved itself with shotguns, in which the barrel and the closed breech first recoil over the full recoil distance, and in the process the pressure is almost entirely relieved (Browning, Walther). Then the breech remains stationary in the rearmost position and the barrel is retarded by the force of a spring and is guided relatively slowly to the front. Together with the breech the cartridge case also remains stationary, so that it is gently drawn out of the barrel. In the process, excessive longitudinal force does not occur in the cartridge case. After the ejection of the cartridge case the breech snaps back to the front again under the effect of the breech-closing spring and takes a new cartridge with it.

Such a shotgun works quite reliably – even with varied loaded ammunition. However, it does have two critical disadvantages:

- a built-in brake, which slows down the movement of the barrel and which can perform an adaptation to extreme loading differences, but works only under strictly defined conditions (for example only when the components are lightly oiled), and
- the relatively slow, powerful recoil movement of the barrel requires support by means of the case. This takes place by pressing the rifle into the shoulder of the marksman. However, if the rifle is shot from the hip, then there is no support and there are serious jams in the loading mechanisms.

Thus such a system is not suitable for shotguns which are intended for use in the military or by the police.

Lately in the case of shotguns there has been a trend to go over to gas operated rifles. Gas operated rifles have long been known in the case of semi-automatic rifles

and have proven themselves in that area. However, in the case of semi-automatic shotguns they require a defined gas pressure and a shotgun cartridge case that is rugged and easy to extract. With modern, heavy cartridges which exhibit a cartridge base made of metal with a long sleeve and a case made of longitudinally ribbed plastic, such gas operated shotguns work free of jamming. However, compared to cartridges of poor quality they are not low maintenance like the recoil operated shotguns. To make up for it the gas operated rifles function when fired from the hip or from the shoulder.

However, the gas operated rifles are rather complicated. Depending on the kind of powder used, they require a more or less expensive cleaning and are susceptible to fouling, rust, and lacking oil due to the many parts gliding upon one another. An economization of the gas piston by means of an impingement of the breech with tapped powder gases results in a structural simplification, but this is accompanied by an increased risk of fouling.

Modern recoil-operated guns are also known, which do manage to get by without a movement of the barrel (e.g. G3 rifle) – however this is at the expense of the insensitivity toward ammunition. In other words, such rifles, in particular such shotguns, are rather particular with regard to ammunition.

Now a semi-automatic weapon, in particular a semi-automatic shotgun which were simple, robust and easy to maintain with regard to the ammunition would have universal application: it could be used as a hunting weapon even in underdeveloped areas

where one is dependent on rather varying ammunition; in addition to this it could also be used as a reasonably-priced police or military weapon, as emergency equipment in military planes etc., thus in particular in cases

- where the weapon is used after a long period of non-use, without being subjected to an inspection and cleaning
- where one cannot be choosy with regard to ammunition and
- where the cost of the weapon cannot be too high.

However, a recoil-operated loading system for shotguns is also known, which is locked, but nevertheless has a rigid barrel. This system is described in US 4 604 942 and exhibits a bolt head carrier loosely supported in the rifle, which due to its mass moment of inertia remains in its position, when all remaining parts of the rifle go to the rear by means of the recoil. The bolt head carrier and the bolt head are constructed in such a way that they run to each other and ultimately contact one another.

However, this rifle, which is in principle so simple, is rather complicated in the implementation. What is more, the recoil-operating loading system does not seem to function safely, because a weapon that came out on the market with this system is no longer offered. This system was later combined with a pump gun mechanism, whereby the self-loading activity can optionally be disabled (Benelli Super M 3). These known weapons exhibit a pipe magazine, which is not practical for a service weapon.

Proceeding from this formulation of the problem, the invention is based on the object of finding a new semi-automatic small arm which at least partially avoids the above named disadvantages of the recoil-operated and gas-operated rifles.

In particular, a simple, cheap semi-automatic small arm which can be manufactured with uncommonly high tolerances is to be found which is insensitive, in particular with regard to its ammunition.

This object is solved in accordance with the invention by arranging powerful springs between the bolt head carrier and the breech of the initially named, generic semi-automatic small arm, by means of which arrangement the (heavy) bolt head carrier supports itself on the bolt head when the latter is locked. However, there is no contact between the bolt head and the bolt head carrier, so that the initial relative movement between these parts is not limited by a stop. (Claim 2).

When the bolt head is locked opposite the barrel, then the weapon is closed. The lock is, as usual, only if the bolt head carrier has moved a piece back from this position. The bolt head carrier moving further back now takes the bolt head along with it. In the ensuing, also usual forward movement of the bolt head carrier and head a cartridge is introduced into the cartridge chamber. The bolt head strikes the cartridge base or cartridge chamber and comes to a stop. The bolt head carrier opening on the bolt head locks the bolt head opposite the barrel and then also comes to a stop.

This is the sequence of movements of a conventional recoil-operated rifle with a rigid barrel and also the sequence of movements in the loading of the weapon of the invention. While in the case of all conventional semi-automatic weapons the bolt head carrier is pressed against a fixed stop by the breech-closing spring, usually against the bolt head, the bolt head carrier of the invention is not fixed on the bolt head. Instead it supports itself on said bolt head by means of powerful springs, but can basically be moved forward without hitting a stop. In the process the adjustment of the breech-closing spring and the springs determines the location that the bolt

head carrier finally occupies. Broad tolerances are possible and admissible here.

In other respects when we talk about the breech-closing spring, a spring arrangement is meant, which can also consist of several springs.

In shooting (from the hip or from the shoulder) the weapon executes a short, powerful backward motion, which is felt by the marksman as recoil. Also all parts that are then stationary toward the weapon as a whole, thus the fixed barrel and also the locked bolt head, follow this recoil motion.

However, in the case of the weapon of the invention the bolt head carrier does not follow the recoil motion, but rather due to its mass moment of inertia first remains in its absolute position, which is in contrast to usual practical operation. That is: as a result of the recoil the barrel and the bolt head move to the back relative to the bolt head carrier, to be precise against the force of the strong spring arrangement; if necessary supported by the significantly weaker breech-closing spring. Considered from the barrel, the barrel and the bolt head remain stationary. The bolt head carrier moves to the front in relation to said barrel and bolt head and is bounded by the spring arrangement.

The heavier the cartridge, the stronger the recoil, i.e., the backward acceleration of the barrel and the parts of the rifle rigidly connected to it the correspondingly stronger the spring arrangement between bolt head and bolt head carrier is pressed together, so that the bolt head carrier moves that much further to the front relative to the bolt head.

In this connection it is expressly pointed out that the spring arrangement acts directly or also only

indirectly between the bolt head carrier and the bolt head and accordingly can support itself on any other part of the weapon that can be brought in stationary position with the bolt head.

The described operation of relative motion between bolt head and bolt head carrier does not come to a stop until a balance is brought about between the spring arrangement on the one hand and the force of inertia of the bolt head carrier, if necessary supported by the force of the breech-closing springs, on the other hand. The distance of motion run is accordingly rather short, since

- the shoulders or the arms of the marksman endeavor to counteract the recoil of the rifle and
- the recoil effect of the fired cartridge on the rifle (in essence) ends no later than the time when the projectile or the shot has left the barrel. (In the case of a shotgun the proportion of the recoil is slow due to gases which escape to the front behind the round or the projectile.)

After the stopping of the relative motion the compressed spring arrangement begins to extend again and powerfully hurls the bolt head carrier to the rear against the force of the breech-closing springs. In the course of its backward motion the bolt head carrier frees the bolt head from the barrel and then takes it along to the rear. Therefore an opening cycle of the loading motions is completed.

As already mentioned above, due to the lack of a stop in the case of a heavier cartridge the relative motion of the bolt head carrier beyond the safety position relative to the front is more pronounced than in the case of a weak cartridge. The unlocking of the rifle thus requires more time in the case of a heavy cartridge than in the case of a weak cartridge. Since in the case of a heavy cartridge a slower

gas pressure decrease is to be expected than in the case of a weak cartridge, there is consequently more time available for this gas pressure decrease.

The more strongly compressed spring arrangement however recoils the bolt head carrier more violently than a spring arrangement that is only weakly compressed by a weak cartridge. For this reason in the case of a heavy cartridge the bolt head carrier will also open the bolt head and extract the cartridge case more rapidly than in the case of a weak cartridge. In the case of shotgun cartridges this is harmless in and of itself, since the heavier shotgun cartridges are also more modern cartridges, which are better able to resist the strains than the weaker cartridges with cardboard cases. However when a certain speed range of the bolt head carrier is exceeded or fallen short of, the speed frame in which on the one hand a safe breech function and on the other hand a reliable extraction are to be reckoned with is abandoned. With that possibly even the storage life of the weapon is jeopardized.

An especially violent opening of the breech is to be expected when the spring arrangement is completely compressed beforehand, so that the intervals of the springs, in particular the flat spiral springs, are seated upon one another. Then the opening speed can be increased in an unexpected manner. In addition parasitic oscillations can overlay the system and interfere. Here too the storage life of the weapon is a critical feature.

To avoid such disturbances and observe the strived for speed range as far as possible, in accordance with the invention it is further proposed that the spring arrangement oppose the compression with a progressively increasing force (Claim 3).

The lower limit of the named speed range and with it the design of the spring system is selected in such a way that

in the case of weak cartridges and fouling a reliable function can still be reckoned with. Now in the case of strain there is no linear increase of the force of the spring arrangement, but rather there is a progressive increase of force, to be precise in such a measure that the spring arrangement cannot be compressed significantly more even in the case of the firing of the heaviest cartridges. Thus the named interference must no longer be reckoned with.

An optimized spring characteristic can for example be achieved by means of a kind of disk spring stack. However, it is cheaper and easier to equip the spring arrangement with a powerful spring with essentially linear load displacement characteristics and in addition to provide a buffer arrangement that is not subjected to stress until after the spring has been partially compressed (Claim 4). In the process the spring and the buffer arrangement can be coordinated to one another in such a way that in the firing of weak cartridges only the spring is stressed and extends itself again, and on the other hand in the case of the firing of a heavier cartridge additionally the buffer arrangement is subjected to stress. The buffer arrangement can ensure the desired progressive behavior with simple resources.

A buffer arrangement made up of at least one pile of elastomer buffers with a large hysteresis has proved to be optimal (Claim 5). The stack arrangement ensures that the buffer arrangement can be easily adapted to heavy cartridges. Further elastomer buffers have a tendency in the case of pressure load to deflect at right angles and in this way to increase their diameter. The measure of the diameter increase however is a function of the length of the buffer, so that several stacked, short buffers become less large in diameter than a single long buffer.

The hysteresis is especially important. It prevents the total conducted force from being redirected back to the bolt head carrier, as for example in the case of a

spring. Hysteresis buffers effect a lessening and phase shifting of the redirected spring power. Thus it is finally possible, even in the case of heavier cartridges, to reliably observe the above named speed range within which the breech works correctly.

Consequently it is possible to correctly fire for example 12 caliber cartridges that are mixed, i.e. with such variable case lengths, as say 70 mm and 76 mm long cartridges. By means of a simple adjustment to the spring and the buffer device even cartridges that are of the caliber 12/65 or 12/89 can be mixed together and fired, if this should not be possible as it is with a standard adjustment.

In the case of a conventional semi-automatic weapon with bolt head and bolt head carrier the bolt head carrier executes a backward motion when releasing, while the bolt head for its part remains stationary. In the process the firing pin is stored in the bolt head carrier, so that the firing pin does not reach the blasting cap of a cartridge until the weapon is already at least to a great extent locked. In order to prevent this also, the weapon of the invention exhibits an intermediate link

- which supports itself in a locked state on the bolt head,
- by which the spring arrangement supports itself on the bolt head, and
- which is carried along by the bolt head carrier in its return motion, so that at least shortly after the release the released bolt head is no longer subjected to direct stress by the spring arrangement.

(Claim 6).

Further, in accordance with the invention it is proposed that the firing pin be directly mounted on the bolt head (Claim 7).

However, the cartridge could be fired if the bolt head is still on the cartridge, regardless of whether the breech is locked or released.

To prevent this, in a further embodiment of the invention it is proposed that a locking block be assigned to the bolt head, which in a locked position is freely passed through by the firing pin and which in an unlocked state blocks the firing pin in a withdrawn, inoperative position (Claim 8). Consequently the locking block acts so to speak as a safety, because the trigger can only fire the cartridge when the bolt head is locked.

This embodiment of the invention is improved even further as a result of the fact that the locking block exhibits a bevel, with which it takes back the firing pin in the inoperative position in the transition from the locked to the unlocked position (Claim 9). If for example as a result of a cartridge defect the firing pin gets caught in the blasting cap during the shot, then it is unstuck by the locking block by means of its movement in the release and brought to an inoperative position.

In accordance with a further, preferred embodiment of the invention this locking block can move transversal to the axis of the bore in the bolt head in and out of the locked state. Moreover, it passes through the bolt head and in the locked position falls in a recess in a component, which is constructed with the barrel in one piece or is rigidly fastened to it (Claim 10). The falling in preferably occurs at three places distributed somewhat uniformly over the periphery. Particularly in the case of a shotgun a generous overdimensioning of recess and locking bolt is possible due to the size of the cartridge. The locking bolt is preferably slightly beveled in the section into which the recess engages,

so that a gentle locking (above all for great case tolerances) as well as releasing of the lock is always possible.

The bolt head carrier can be designed to be moved on the side of the bolt head opposite the recess along it. In the process the locking block has a front and a rear foot strip and the bolt head carrier has a front and a rear carrying strip, to be precise, of the type that

- the returning bolt head carrier in the advanced return movement with its front carrier strip runs into the front foot strip of the locking block, in order to extract it from the recess and
- the bolt head carrier in its closing motion with its rear carrier strip runs into the rear foot strip of the locking block, in order to force it into the recess,

whereby at least one each of the front or rear foot and carrier strips is beveled (Claim 11).

When the bolt head is locked, then the bolt head carrier can be moved freely forward up to the position that it occupies after locking has been completed. If the bolt head carrier moves from this position to the rear, then after a more or less large lost motion run it pulls the locking block out of the recesses and then carries the bolt head along with it. In the process it is unimportant how great the lost motion is that is formed between the foot strips of the locking block and the carrier strips of the bolt head. It is only important that the foot strips fit into the opening formed in between the carrier strips in the bolt head carrier.

In this way a simple and less precise manufacture is possible; imprecise parts or replacement parts can be installed without further fitting.

The weapon of the invention can for example be used for long-barrel machine guns or for semi-automatic rifles. However, the system of the invention is particularly suited for a semi-automatic shotgun (Claim 12). Precisely here the person skilled in the art can by means of appropriate adjustment of the power and the structure of the spring mechanism and the mass of the bolt head carrier, create a semi-automatic shotgun that processes the most variable kinds of ammunition free of disturbance, but which for manufacture requires only a fraction of the costs of other semi-automatic shotguns.

However, the initially named small arm can also be a repeating firearm with a bolt head that can be moved in longitudinal direction or in the direction of fire, a locking block that can be moved transversal to this, which for the purpose of locking the breech can be inserted in recesses in said breech and in the case of the weapon, and a handle for moving the bolt head forward or backward as well as for inserting and releasing the locking block (Generic part of Claim 13).

Soon after the emergence of the repeating firearms with cylinder breech mechanisms attempts were made to simplify the loading motion. To load by hand namely the marksman had to make a transversal motion, a back motion, a forward motion and again a transversal motion. Therefore they introduced a kind of worm gear which converts a simple back and forward motion into the above specified complicated movement. Due to the complicated mechanics these so-called straight pull action systems either did not prove themselves or were too expensive. In the case of these known straight pull action systems a breech block is assigned to the actual breech or bolt head, which could be viewed as a bolt head carrier.

There are also other systems for simplifying the loading motion. Such a system is outlined in the generic term of

Claim 13 and was even realized prior to the above named straight pull action system: the breech can be moved in a straight line forward until reaching the cartridge base in the cartridge chamber. When it reaches this breech position, a cross slide or locking block is moved in recesses in the breech and in the case of the weapon and in this way locks the breech. A bottom lever rotated downward in an arc-shaped motion and releases the locking block in an initial run. In an end run then the unlocked breech is pulled back. Not until the bottom level is rotated upward is the breech closed and locked. Since 1895 a box magazine has also been known for this system.

Similar systems are not activated by a bottom lever, but rather by a slide that can be moved in a straight line, which is joined to the fore end. However, from there the locking block executes a rotating motion.

All the described systems are quite complicated and correspondingly expensive and sensitive.

In the case of the locking blocks of bottom lever and fore end loaders, particularly in the case of heavy cartridges, high surface pressures occur. These can only be counteracted by means of awkwardly shaped constructions or extremely high precision.

Particularly in the case of weapons for emergency use, ruggedness, small dimensions and reliability should combine with a low price. After all, such weapons should only be used in rare emergencies, but are then supposed to function safely under contrary circumstances.

It is the object of the invention to improve the initially named repeating firearm in such a way that at least some of

the above named difficulties can at least be partially avoided.

Preferably a straight pull action repeating firearm should be created which is suitable for emergency use, but also for use in the military, police force or the like.

This task is solved by means of providing the initially named rifle with a bolt head carrier that can be moved parallel to the bolt head via an initial and final run and carries said bolt head with it on the final run, and that on the bolt head carrier at least one beveled surface is constructed, which engages in an opposite surface on the locking block in such a way that the locking block is released or inserted when the initial run is made (Claim 13).

In a way the longitudinal slide of the above described straight pull action breech is used in order to activate a locking block which is known from the bottom lever loader. In the process the bolt head can be kept very short, as a result of which the total length of the rifle is decreased. Since the longitudinally movable bolt head carrier, which can be moved in a longitudinal direction, does not need to rest on the locking block in longitudinal direction, the path of motion of the bolt head carrier does not have to be precisely defined, but rather only has to be long enough.

In the process it is even practical that the bolt head carrier be able to be moved via a lost motion run prior to the initial run, in said lost motion run which the breech remains locked (Claim 14). This lost motion run not only compensates for structural inaccuracies, but also makes it possible for the marksman to gather momentum. The locking block consequently is not unlocked by the bolt head carrier until it has picked up speed. A breech block is simply carried along in the process,

perhaps without the marksman even noticing anything about the disturbance.

A preferred improvement of the invention consists in the case of the weapon being formed by the rear end of the barrel or by a barrel retainer case as well as by a plastic case, and that the recesses are constructed in the case of the weapon on the rear end of the barrel or in the barrel retainer case (Claim 15). During firing the occurring main forces are immediately conducted into the barrel by the bolt head via the locking block. The actual case made of plastic absorbs only parasitic forces, if necessary carries flexible parts and protects all the parts from fouling.

Due to the large, structural degree of freedom the rifle of the invention can have practically any kind of appearance. The handle for the bolt head carrier can be the butt, the front shaft, or even a bottom lever or simply a handle which protrudes laterally, from the rear or from the front out of the (plastic) case.

Further in accordance with the invention it is proposed that the firing pin be mounted directly on the bolt head, in particular that it pass through it (Claim 16).

However, the cartridge could be fired when the bolt head is still on the cartridge, no matter whether the breech is locked or unlocked.

To prevent this, in a further embodiment of the invention it is proposed that a locking block be assigned to the bolt head, which in a locked position is freely passed through by the firing pin and which in an unlocked state blocks the firing pin in a withdrawn, inoperative position (Claim 17). Consequently the locking block acts so to speak as a

safety, because the trigger can only fire the cartridge when the bolt head is locked.

This embodiment of the invention is improved even further as a result of the fact that the locking block exhibits a beveled edge, with which it takes back the firing pin in the inoperative position in the transition from the locked to the unlocked position (Claim 18). If for example as a result of a cartridge defect the firing pin gets caught in the blasting cap during the shot, then it is unstuck by the locking block by means of its movement in the release and brought to an inoperative position.

In accordance with a further, preferred embodiment of the invention this locking block can move transversal to the axis of the bore in the bolt head in and out of the locked position. Moreover, it passes through the bolt head and in the locked position falls in a recess in a component, which is constructed with the barrel in one piece or is rigidly fastened to it (Claim 19). The falling in preferably occurs at three places distributed somewhat uniformly over the periphery. Particularly in the case of a shotgun a generous overdimensioning of recess and locking bolt is possible due to the size of the cartridge. The locking bolt is preferably slightly beveled in the section into which the recess engages, so that a gentle locking (above all for great case tolerances) as well as releasing of the lock is always possible.

The bolt head carrier can be designed to be moved on the side of the bolt head opposite the recess along it. In the process the locking block has a front and a rear foot strip and the bolt head carrier has a front and a rear carrying strip, to be precise, of the type that

- the returning bolt head carrier in the advanced return movement with its front carrier strip runs into

- the front foot strip of the locking block, in order to extract it from the recess and
- the bolt head carrier in its closing motion with its rear carrier strip runs into the rear foot strip of the locking block, in order to force it into the recess,
- whereby at least one each of the front or rear foot and carrier strips is beveled (Claim 20).

When the bolt head is locked, then the bolt head carrier can be moved freely forward up to the position that it occupies after locking has been completed. If the bolt head carrier moves from this position to the rear, then after a more or less large lost motion run it pulls the locking block out of the recesses and then carries the bolt head along with it. In the process it is unimportant how great the lost motion is that is formed between the foot strips of the locking block and the carrier strips of the bolt head. It is only important that the foot strips fit into the opening formed in between the carrier strips in the bolt head carrier.

In this way a simple and less precise manufacture is possible; imprecise parts or replacement parts can be installed without further fitting.

The weapon of the invention can for example be used for small bore repeating weapons. However, the system of the invention is particularly suited for a repeating shotgun (Claim 21), preferably a pump-action shotgun.

As a whole the system of the present invention proves to be especially well-suited for a repeating rifle for large cartridges, in particular for cartridges with a caliber of more than 15 mm, the two or more extractor hooks

then reliably hold and conduct the very large cartridge.

The repeating breech can also be used for a semi-automatic weapon by connecting a reloading mechanism with the handle or a pivotal point provided in its place, for example a gas regulator.

The invention also relates to a cartridge ejection arrangement with at least two cartridge extractor hooks spring mounted on a movable breech or bolt head, which are preferably opposing each other in particular for the rifles of Claim 2 and Claim 13 (Generic part of Claim 23).

A small arm, in particular a semi-automatic weapon with a barrel and a breech which when opening moves approximately from the rear end of the barrel to the rear along the axis of the bore (median axis of the barrel) exhibits as a rule a cartridge ejection arrangement with an extractor hook and an ejector. The extractor hook encompasses the border or semi-border of the cartridge or engages in its base-peripheral groove. The ejector is seated, in relation to the axis of the bore, approximately opposite the hook, so that the border of the cartridge base runs into it. The ejector is designated here as stationary. Among other things, by this it is understood here that it is either rigidly mounted to the weapon or its case or that it is flexibly mounted in the breech or the bolt head and at the end of its return motion runs into a weapons-proof resistor.

The cartridge or cartridge case is ejected transversal to the axis of the bore. In the process, the extractor hook is seated, in relation to the axis of the bore, on the side to which the cartridge or cartridge case is ejected. The ejector is seated on the opposite side.

In the case of cartridges with e.g., a border groove which, turned toward the breech block (front surface of the breech), forms an even surface, during ejection the extractor hook is snugly seated in the groove with a complementary supporting surface. The cartridge or its case therefore cannot be released from the hook until it is cocked. In this way a reliable ejection of the cartridge case is ensured. In the case of a cartridge border with a round profile, as for example in the case of small arm and shotgun cartridges, this support is essentially only guaranteed by frictional connection. A correspondingly powerful spring then subjects the extractor hook to stress in order to make a reliable ejection possible.

As far as can be inferred from the figures of US-3 906 651, such a cartridge is shown there with a round profile. This cartridge is seated on the breech block of a breech which exhibits two opposing extractor hooks. The invention starts from this state of the art.

The reason why this ejection arrangement has been chosen cannot be inferred from this publication, nor is it possible to infer from it how the ejector should be arranged and constructed. The profile of the two extractor hooks is also unusual and facilitates the sliding from the cartridge border. Such a sliding must be possible in the case of one of the hooks if it is not intended to be uncommonly softly cushioned.

However, Figure 2 of this publication makes it possible to recognize a longitudinal groove in the breech which is located close to one of the hooks and could hold the ejector.

The ejection of shotgun cartridges for example of the caliber 12 or 10 is often a problem particularly in the case of very long cartridge cases and in semi-automatic weapons, because the rapidly opening breech takes the extractor hooks with it, which for their part then could slip from the cartridge border with round profile.

Here double the amount of extractor hooks known from the named publication could possibly remedy the situation. Also in the case of extremely large cartridges, which have a disproportionately small border (flare, tear gas or shotgun cartridges of the caliber 4 (26.5 mm), shell cartridges (4 cm) or the like.) double the amount of extractor hooks could be advantageous.

Earlier with small arms, in particular with service weapons, it was required that the marksman be right-handed. Left-handers were trained to use the weapon with their right hand. Today they are attempting to do justice to the characteristics of the marksman and also equip weapons for use by left-handers. Particularly in the case of semi-automatic rifles of the Bullpup style (the magazine is located behind the butt) this requires cartridge ejection away from the face of the marksman, since the ejector is located at the level of the cheekbone.

But also in the case of other weapons, for example with aircraft machine guns of helicopters, the direction of ejection is not voluntarily adjustable and should be adapted to the mounting conditions as best as possible. In the process the cartridge ejection can take place anywhere except at the reloading mechanism. For example if an cartridge gripper seated above the weapon is used, then the ejection can take place to the right or to the left, or even below, depending on where a cartridge case container or spent ammunition bag can be mounted.

It is the object of the invention to create an improved cartridge ejection arrangement. In particular at least one of the above outlined disadvantages should be at least partially remedied and preferably an arrangement of the initially named type be created, whose ejection direction can be changed.

To solve this task it is proposed to improve the initially named arrangement by

being able to assign a stationary ejector to one or each of the cartridge extractor hooks in such a way that in the case of a returning breech or bolt head the cartridge or cartridge case is jointly extracted from a cartridge chamber by all cartridge extractor hooks when it is released from the cartridge chamber, pivots around the cartridge extractor hook and in the process is ejected to the side which doesn't have an ejector assigned to it (Claim 23).

In the process it is assumed that each of the extractor hooks has only a limited capacity for keeping the cartridge or cartridge case in the position in which it is pulled out. The use of several extractor hooks, moreover, definitely has merits, in particular with the above mentioned cartridges. If all the extractor hooks, except for those on whose side the ejection is to take place, have an ejector assigned to them, then the ejection can take place in any direction to which an extractor is assigned.

Of course the number of extractor hooks is limited, and three or more hooks will only be practical for cartridges with very large diameters. In an embodiment of the invention it is therefore proposed that only two cartridge extractor hooks opposing each other and one convertible ejector be provided (Claim 24). However this is necessary in the case of a Bullpup weapon, and also sufficient.

If now in addition the ejector exhibits two ejector projections, which are arranged on both sides of one of the two cartridge extractor hooks and run in longitudinal grooves of the breech or bolt head, which join in its breech block on both sides of the cartridge extractor hook (Claim 25), then an arrangement is created, which

- extracts even difficult cartridges and cartridge cases perfectly and

- can be converted with the simplest of resources from right to left ejection and vice versa.

For conversion purposes only the ejector has to be moved. The location of the breech and the extractor hooks remains unchanged.

Conventional cartridge extractor hooks exhibit a hook-shaped end with surfaces turned toward the breech block, which encompass a cartridge border. In accordance with a further embodiment of the invention it is proposed that if the hook-shaped ends encompass a cartridge border whose surfaces form an acute angle to a plane parallel to the breech block, so that they remove themselves from the middle of the breech block to the front (Claim 26).

Preferably this acute angle lies between 0° and 15° (Claim 27).

In contrast to the initially named US publication, in which the extractor hooks are designed complementary to the profile of the cartridge border, in the case of the invention preferably a surface is used which is seated on the border. Thus cartridges of the most variable style can be used, hence also a cartridge whose border forms a parallel surface to the breech block and is turned away from it. Such a border can be present in the case of cartridge cases for special cartridges, for example flare cartridges. Such cartridge cases are manufactured for example by turning on a lathe or by indirect extrusion.

The arrangement of the invention can be used for all kinds of small arms. It is particularly advantageous for large caliber cartridges. For example it is especially preferred to assign said arrangement e.g. to a shotgun (Claim 28), in particular a repeating or semi-automatic shot gun. Here the structural diversity and

mutual deviation from cartridges for one and the same caliber is particularly great, on the other hand the need for retrofitting a weapon for left-handed and right-handed marksmen is particularly great. Such a weapon is namely not a personal weapon like an automatic rifle, which can accompany a soldier during practically his entire period of duty, but rather is often only given out for special operations. Basically weapons with a caliber of more than 15 mm are not included here.

The invention also relates to a large caliber gas-operated rifle with a central power input part, which holds the rear end of the barrel and the locking abutments of the breech. This gas-operated rifle employs the principle of the breech of Claim 1.

By "large caliber" here in particular a rifle with a caliber or greatest case diameter of the cartridge of more than 15 mm is understood.

In the case of large caliber rifles a heavy missile, for example a projectile, an adapter base projectile, a charge of shot, a gas body or the like is brought to a speed which is rather low when compared with other, small caliber high-performance rifles. For this reason the gas pressure is also comparatively low, particularly in the front region of the barrel.

In the case of a large caliber, gas-operated rifle whose cartridge diameter is above 15 mm, the breech is large and long, and hence heavy, so that the force required to reload it is also great. Since on the other hand the gas pressure, as already mentioned, is low, the action area of the gas piston must be great. Accordingly the gas quantity which is depleted from the barrel during firing is also great.

For this reason recoil-operated guns usually have been preferred, which however have the disadvantage of reacting particularly sensitively.

In addition in the case of a large caliber recently a central anchoring element has been provided to save weight, upon which all occurring forces are supposed to have the greatest possible effect. To a great extent the case can be designed in the lightest plastic style, since at the most it is subjected to little stress. A gas piston however requires at the tapping point of the barrel, which usually interacts with the gas cylinder, an additional point of power input and consequently is rather heavy in construction.

In the case of large caliber rifles there is also the problem that the rifle is built rather long, when it is constructed as an enlarged, normal caliber rifle.

The invention is therefore based on the object of improving the initially named large caliber rifle so that at least one of the initially named problems is at least partially corrected.

In particular the invention is based on the object of creating a semi-automatic rifle for large caliber shell cartridges with long cartridge length and short cartridge case which is light and reloads reliably.

In accordance with the invention this task is solved by having the initially named rifle exhibit a gas intake opening in the power input part in the barrel, and that a gas cylinder is firmly joined with the power input

part, which is joined with the gas intake opening (Claim 29).

The gas intake opening in the power input part makes a separate, power absorbing enclosure of the gas intake opening unnecessary. Simultaneously this is placed far to the rear, where the gas pressure is sufficient for unlocking and operating even a heavy breech with a long reloading path.

The barrel of the weapon of the invention is preferably provided, as is generally the practice, with a cartridge chamber that is constructed in one piece with the barrel. However, it is also conceivable that the cartridge chamber be separated from the barrel. Within the scope of this invention the term "barrel" includes the cartridge chamber, whether it is constructed in one piece with the barrel or not. In accordance with the invention the gas intake opening is at the front end of the cartridge chamber and joins into a bore hole in the power input part, which for its part joins into the front end of the gas cylinder (Claim 30). The cartridge chamber is, compared with the caliber of the barrel, often rather short in the case of extremely large caliber rifles; in the case of shell cartridges of the above described type the cartridge chamber is even extremely short. Thus the slow acceleration of the breech by action of the discharge gases is sufficient to ensure prior to the opening of the breech that the projectile has then already left the barrel. The pressure decrease occurs in the case of such large caliber rifles usually so prematurely that the excess pressure in the barrel is rather low when the projectile leaves the barrel. Simultaneously a pipe or similar component has been dispensed with, while the power input part ensures that even a high pressure in its bore is harmlessly received and passed on to a gas cylinder.

This gas cylinder is preferably constructed in the power input part (Claim 3) and consequently does not require its own power absorbing component.

The bore can extend diagonally in or opposite the direction of fire in order to utilize or inhibit the kinetic energy of the discharge gases. Since this kinetic energy at the end of the chamber is quite slight, it is preferred that the bore hole extends at a right angle to the direction of fire (Claim 31). In this way the power input part can be kept as compact as possible.

The gas cylinder which directly connects to the bore can be seated laterally or underneath the chamber. However, in order to avoid excessively extending the width of the weapon and to be able to mount a magazine under the breech, it is preferred that the gas cylinder be seated above the cartridge chamber (Claim 32). Since the gas cylinder is constructed in the power input part, in this way a style that is very stout and in particular also short in longitudinal direction is ensured.

The breech is, as usual, formed from a locked bolt head and a bolt head carrier. To make a regulator for the bolt head carrier unnecessary and to keep the style of the weapon short in spite of the gas cylinder located far in the rear; in accordance with a further embodiment it is proposed that the bolt head carrier form the gas piston (Claim 33).

Similar to a semi-automatic shotgun with a pipe magazine, where the gas piston surrounds the magazine pipe, in accordance with the invention it is preferred that a pipe be firmly joined to the bolt head carrier, pass through the gas cylinder and

be passed through as an attachment pipe for a breech-closing spring (Claim 34). The inner surface of the gas cylinder exhibits therefore an annular-shaped surface, and moreover the action of force occurs precisely centrally on the bolt head carrier. The pull-back spring for the breech, the so-called breech-closing spring, further passes through the pipe, so that the bolt head carrier forming the gas piston can also be reset precisely centrally and consequently cannot jam. The gas cylinder can, viewed at its diameter, consequently also be built shorter than would otherwise be necessary.

In accordance with a further embodiment the pipe also has the purpose of bearing a loading handle, which is either mounted to the pipe or can be attached or joined with it for the purpose of reloading (Claim 35).

There are various means of locking, for example lateral locking shutters or locking lugs mounted in a circle to the longitudinal center of the barrel, but the shutters are applied off center, while lugs imply a backward motion of the bolt head and consequently increase the overall length of the rifle, even if only slightly. Therefore in accordance with the invention it is proposed that a locking bolt be passed transversal through the bolt head and be pressed by the bolt head carrier in its resting position into a safety position, in which it engages in constructions of the power input part and as a result locks the bolt head (Claim 36). The constructions are advantageously mounted thereby somewhat circular-symmetrically to the longitudinal axis of the barrel. The bolt head consequently does not have to travel an unlocking path, when it is unlocked, but rather only the locking bolt is pulled out at a right angle to the named longitudinal axis. The device for this purpose can be located above the bolt head and does not take up any overall length.

A tilting lever is preferred as such a device, which is arranged in the bolt head, engaging on the one hand in the path of motion of the bolt head carrier and on the other hand in the path of motion of the locking bolt and in a movement of the bolt head carrier pulls the locking bolt from its resting position out of the constructions of the power input part (Claim 37). Such a tilting lever is pivoted e.g. on a swiveling axis, which is transversally arranged in the bolt head. However, such a device can also be formed by a pressure spring which forces the locking bolt out of its resting position when the bolt head carrier makes room.

Additionally it is preferred that the pulled out locking bolt engages in the bolt head carrier so that with its movement the locking bolt and with it the bolt head is taken (Claim 38). For example a positive connection is brought about between the bolt head and the bolt head carrier, regardless of how quickly the return of the bolt head carrier takes place, thus for example also in the case of slow reloading.

Preferably the locking bolt exhibits an oblong hole which is passed through by the firing pin, the firing pin exhibits a recess behind the locking bolt, and the oblong hole exhibits a beveled edge to the rear, which engages on the recess of the firing pin and pushes it back when the locking bolt is pulled out of engagement with the constructions of the power input part (Claim 39). Thus after the shot the firing pin is forcefully pushed out of engagement with the cartridge and in the case of an unlocked breech cannot reach the cartridge base. Consequently neither can a burst blasting cap (so-called primer failure) keep the firing pin to the front,

nor can a premature firing take place, when the bolt head is not yet locked. This guarantees reliability even in the case of rare malfunctions.

Normally a bolt head exhibits only one extractor. However, providing two extractors is also known. The invention deviates from the two teachings to the effect that two recesses are constructed in the bolt head transversal to the locking bolt, in which from the rear a bore hole for a set-bolt and a spring pressing it forward are constructed, that in one of the recesses an extractor which can be swiveled against the force of the set-bolt is inserted, and that in the opposite recess if possible a supporting element is inserted, which, opposite the extractor, laterally supports the base of a cartridge or cartridge case (Claim 40). The extractor and the supporting element are hence facing one another.

The supporting element supports the cartridge case after the extraction, so that the cartridge case does not slip from the opposing extractor hook. After the shot the breech first undergoes an acceleration phase and then a deceleration phase. During the deceleration phase the base of the accelerated cartridge case rests firmly on the breech block. The front area of the bolt head is called the "breech block".

Spring, set-bolt and extractor on one side and supporting element on the other side can if necessary be exchanged to change the ejection direction.

However, in the case of the initially named shell cartridges the cartridge case is very short, so that it could possibly

leave the cartridge chamber while still in the acceleration phase or shortly afterwards. Since the supporting element and the extractor are seated in recesses of the same type, they can be interchanged. In this manner it is possible to rearrange the ejection direction of the rifle so that the rifle can be easily adapted to right-handed shooters or left-handed shooters.

The object of the invention will be explained in greater detail using an embodiment and the attached schematic drawing. The figures show the following:

- Fig. 1 a longitudinal section through the rear part of the barrel piece and the breech of a shotgun in accordance with the invention, with a closed and locked breech;
- Fig. 2 a section as in Figure 1, however with an unlocked breech and right after the firing of a shot;
- Fig. 3.1 a longitudinal section through the bolt head carrier, on a slightly enlarged scale compared to Figures 1 and 2;
- Fig. 3.2 a perspective view of the bolt head carrier represented in Figure 3.1 from diagonally from above;
- Fig. 4 a cross-section through the rear-most part (end section) of the barrel piece along the center line of a locking recess;
- Fig. 4a the detail of Fig. 4 enlarged and seen at a right angle to the longitudinal direction of the weapon;

- Fig. 5.1 a view of the locking block from behind;
- Fig. 5.2 a lateral view of the locking block;
- Fig. 6 a view of the breech approximately in the state shown in Fig. 1, diagonally from above;
- Fig. 7 a greatly enlarged extractor hook; and
- Fig. 8 a lateral view of the stripping block; and
- Fig. 9 a section along the line IX – IX through the stripping block of Fig. 8.
- Fig. 10 a longitudinal section through the rear part of the barrel piece and the breech of a shotgun in accordance with the invention, with closed and locked breech;
- Fig. 11 a section as in Fig. 1, however with an unlocked breech and immediately after the firing of a shot;
- Fig. 12.1 a longitudinal section through the bolt head carrier on a slightly enlarged scale compared to Figures 1 and 2 ;
- Fig. 12.2 a perspective view of the bolt head carrier represented in Fig. 3.3 diagonally from above;
- Fig. 13 a view of the breech approximately in the state shown in Fig. 1, diagonally from above;
- Fig. 14 an oblique view of a breech of a semi-automatic shotgun which is equipped with the arrangement of the invention;

- Fig. 15 the top view of the breech with ejector;
Fig. 16 the view of an extractor hook, and
Fig. 17 the partial view of an ejector, seen from the front or the rear.
Fig. 18 a longitudinal section through a rear barrel end with power input part and breech,
Fig. 19 a perspective representation of the breech of Fig. 1,
Fig. 20 a schematic cross-section through the arrangement shown in Fig. 1, and
Fig. 21 a horizontal section through the bolt head, with the rear part of a cartridge.

The drawing shows an embodiment of the invention as a whole. For this reason in the following reference will be made to individual figures of the drawing only when this facilitates the location of a specific element/feature.

The only partially shown rifle is a semi-automatic shotgun, which can be provided with a box magazine (Fig. 1, 2). The shotgun exhibits a barrel piece 1 with a center line or axis of the bore 37. In the rear part of this barrel piece a cartridge chamber 3 is constructed, to which at the rear an end section 4 of the barrel piece 1 connects. The end section 4 has a somewhat U-shaped cross-section open to the bottom (Fig. 4) and exhibits an axial, upper locking recess 5 and

two locking notches 6 below. The latter are seated in the free ends of both legs of the U cross-section. About at half height of each U leg a groove 10 running parallel to the axis of the bore 37 is provided, in which a cartridge extractor 61 (Fig. 6) can run.

In the case of a cocked weapon the cartridge chamber 3 is closed to the rear by a bolt head 11. This bolt head 11 is passed through by a front vertical cross bore hole, which for its part holds a locking block 25. This locking block exhibits at a right angle to the axis of the bore a reverse t-shaped cross section (Fig. 5); with a conical locking extension 7 on the free (top) end of the middle jamb and a locking finger 8 on each of the two ends of the (bottom) cross jamb.

In locked position the locking extension 7 engages in the locking recess 5 and simultaneously the locking fingers 8 engage in the locking notches 6.

All areas of contact are diagonal to the vertical, in order to make possible an effortless establishment and release of the engagement of the locking block 25 in the end section 4 of the barrel piece 1. However, the oblique angles of the areas are so low that the engagement is self-locking, that is cannot be opened by means of force on the bolt head 11 along the axis of the bore 37 to the rear.

The barrel piece 1 and bolt head 11 are consequently directly connected with each other during the shot and transfer the high initial forces immediately to each other. No other element is affected by the transfer of force. The barrel piece 1 can therefore be admitted with its rear end into a plastic case 2. The greatest occurring forces are namely not conducted into the case 2.

The bolt head 11 is seated on a bolt head carrier 13 (Fig. 3.1 and 3.2). The bolt head carrier 13 can be moved longitudinally around a certain distance relative to the bolt head 11. The bolt head carrier 13 exhibits a longitudinal recess 54, a lateral recess in the area below the locking block 25 and a plane surface 59 behind the lateral recess.

To the front the lateral recess 53 is bounded on both sides of the longitudinal recess 54 by a nose 55 on either side, said noses which protrude upward and downward and overhang the plane surface 59.

The locking block 25 is constructed in such a way that in its upper locking position the lower area of its cross jamb is flush with the lower area of the bolt head 11 (Fig. 1). In this position the bolt head carrier 13 can move back and forth below the locking block 25, and in the process the bolt head 11 and the locking block 25 can glide on the plane surface 59 of the bolt head carrier 13.

However, if the bolt head carrier 13 moves over the resting position shown in Fig. 1 to the rear, then its two noses 55 with their rear edges grasp the cross jamb of the locking block 25 on both sides and pull it down to lateral recess 53. This position is shown in Fig. 2. In this position the breech block 25 disengages itself from the end section 4 of the barrel piece 1. The bolt head 11 can now move to the rear relative to the barrel piece 1.

The unlocked bolt head 11 runs in its further backward movement into a guide (not shown) in the case 2 in such a way that the locking block 25 cannot move up.

In closing the bolt head 11 it runs into the rear end of the cartridge chamber 3. The bolt head carrier 13 is then pulled further to the front or pressed by a breech-closing spring (only indicated schematically as direction of force). In the process a bevel 57 forming the rear wall of the lateral recess 53 subjects the locking block 25 to stress in an upward direction, thus shifts it upward in its forward motion, until finally the plane surface 59 engages the locking block 25 and the position of Fig. 1 is again reached.

In the bolt head 11 a rotary stripping block 27 is arranged behind the locking block 25 and approximately parallel to its middle jamb, said stripping block 27 which is secured by means of a catch 28 in its normal position (Fig. 1, 2, 6 and 8, 9). The stripping block 27 is held in a rear, vertical cross bore hole 23 in the bolt head 11. The catch 28 can be released through the bore hole 24 in the bolt head 11 (Fig. 6).

The breech block 25 and the stripping block 27 are passed through by a firing pin 19 and each exhibit a bore hole 31 and 34 for this purpose.

The bottom end of the stripping block 27 is constructed as a hammer foot 51, which runs in a groove 49 open at the top with reverse T-shaped cross section in the head bolt carrier 13. In operating state, i.e. in the normal position, in which the hammer foot 51 engages the flanks of the groove on both sides and the stripping block 27 is held by its catch 28, a recess 35 of the firing pin 19 runs into a projection 36 in the bore hole of the stripping block 27. This prevents the firing pin 19 from falling backwards out of the bolt head 11 when it is in normal position. If the stripping block 27 after negotiating the catch 28 is turned by about an eighth turn, then the firing pin 19

can be removed to the rear. Since in this state the hammer foot 51 is still engaging the upper flanks of the groove 49, the bolt head 11 and the bolt head carrier 13 are still fitted together, while a replacement of the firing pin 19 can be performed. Not until a full quarter turn of the stripping block 27 (only possible after removal of the firing pin 19) is the hammer foot 51 released from the groove 49 and the bolt head 11 can be removed from the bolt head carrier 13.

The bore hole 31 in the locking block 25 passed through by the firing pin 19 is shaped as an oblong hole, which makes it possible for the locking block 25 to occupy the positions of Fig. 1 and Fig. 2 (locked and unlocked) in spite of the presence of the firing pin 19.

The firing pin 19 exhibits a bulge 29 behind the oblong hole 31, while in the rear side of the oblong hole 31 at the bottom a complementary beveled recess 33 to the bulge 29 is constructed. The recess 33 and the firing pin bulge 29 are designed in such a way that the firing pin 19 can only submerge into the oblong hole 31 when the locking block 25 is located in its uppermost position (locking position of Fig. 1). In this position the firing pin 19 can submerge so deeply into the oblong hole 31 that its tip for igniting a cartridge can emerge from the front area of the bolt head 11.

If the locking block 25 is lowered, then the recess 33, due to its special shape, presses the firing pin bulge 29 back so far that the firing pin tip can no longer reach a cartridge. This ensures that a cartridge can only be fired when the bolt head 11 is sufficiently locked.

As described, bulge 29 and recess 35 hold the firing pin 19 loosely between two end positions; the beveled recess 33 of the locking block forces a withdrawal of the firing pin when unlocking. Consequently, as a rule a firing pin spring is unnecessary and therefore does not need to be provided.

Now a handle, for example a movable front shaft, could be mounted on the bolt head carrier 13. A detachable lock could secure this handle in the front most position. In this case the breech-closing spring 9 is of course not required, but rather the handle and with it the bolt head carrier would be moved back and forth to reload the weapon.

However, in the example shown it is a matter of a semi-automatic. Here the bolt head 11 is extended to the rear by an axial extension pipe 15, which holds and guides the – here also – extended firing pin 19. The rear end of the bolt head carrier 13 is extended upward in the formation of an abutment 43.

At a distance to the abutment 43 a transition piece 39 is lowered into the bolt head carrier 13 from above in such a way that it is held in front in the bolt head carrier 13 by means of a step 40, but can be moved to the rear.

The abutment 43 and the transition piece 39 each exhibit a through hole, both of which are in alignment with each other and which are passed through by the extension pipe 15. The extension pipe 15 serves as a holder for a powerful pressure spring or opening spring 17 which is preferably constructed as a spiral-shaped curved wire spring and surrounds the extension pipe. The pressure spring 17 supports itself in unstressed state in the rear and in the front on the abutment 43 or on the transition piece 39 (until the transition

39 is seated on the step 40 of the bolt head carrier 13).

As a result of this a rattling (caused by the pressure spring 17 moving back and forth) is prevented when the breech is opened.

As can be recognized, the powerful opening spring 17 is to a great extent inactive. It only goes into action when the bolt head 11 moves to the rear relative to the bolt head carrier 13 in the locked position of Fig. 1.

Such a movement actually does occur, to be precise when the weapon is being fired: then the rifle, that is also the barrel piece 1 and the bolt head 11 locked with it, are forced into a backwards motion which endeavors to keep the heavy bolt head carrier 13 in its position. This backwards motion does not need to exhibit great amplitude. The compression of a shaft cap made of rubber, which for example is propped against a wall, is perfectly sufficient.

If one looks at the drawing, this real movement is difficult to imagine. Instead of that one can assume that the bolt head carrier 13 moves a short distance to the front when the shot is fired.

The following happens: in the case of this movement forward the pressure on the breech-closing spring 9 is insignificantly decreased, but instead of this the opening spring 17 is under tension. In the process the transition piece 39 and the abutment 43 move towards each other. This movement stops, depending on the strength of the recoil and therefore depending on the strength of the momentum of the fired cartridge.

When this movement comes to a standstill as a result of the compression of the opening spring 17, then a counter-movement begins, triggered by precisely this compressed spring 17. In the

course of this counter-movement the bolt head carrier 13 is now powerfully yanked to the rear, whereby it pulls the locking block 25 down with its noses 55 and via the block then carries the bolt head 11 along in its further backwards movement. In the process the rear end of the bolt head carrier 13 cocks the hammer of a known striking mechanism not shown here, and performs a loading motion. In the advance motion the locking block 25 is pressed back up again in the above described manner and supported from below by the plane, upper surface 59 of the bolt head carrier 13. It is completely unimportant whether the bolt head carrier 13 is located one millimeter further to the front or not. Side by side tolerances therefore have no influence.

As already mentioned above, the – relative – advance motion of the bolt head carrier 13 during the shot is that much longer, the stronger the recoil is during the firing. Correspondingly the opening spring 17 is under that much more tension the stronger the recoil is. And the more powerful then the recoil of the entire breech 11, 13 is. To compensate for this, additional shock absorbers in the form of elastomer buffers 41 are mounted. For this purpose, on both sides of the middle in the bolt head carrier 13 there are two bars arranged parallel to the axis of the bore 37, which pass through the abutment 43 and submerge into recesses in the transition piece 39. These bars 45 pass through the named elastomer buffers 41. A flange 47 on each bar 45 between the abutment 43 and the buffer 41 prevents the bar 45 from slipping to the rear. The named recesses are open at the bottom for easy installation.

The elastomer buffers 41 are preferably composed of several ring elements and consist preferably of a material with high hysteresis. When a weak cartridge is fired, then the elastomer buffers 41 are either not compressed or are barely compressed. However, when a very heavy

cartridge is fired, then the two elastomer buffers 41 are greatly compressed, whereby they return less energy in their renewed extension than they previously took in. The increased recoil energy of heavier cartridges is thus at least partially destroyed – to be more precise converted into other energy forms. As a result of this the breech is able to fire cartridges with very greatly varying recoil energy and hence muzzle energy, without have to use for example another locking spring 17 or without having malfunctions occur. A special stop between the bolt head 11 and the bolt head carrier 13 is lacking. Only the arrangement of opening springs 17 and elastomer buffer(s) 41 serves as a stop.

A further advantage of the shown breech 11, 13 lies in the fact that in its unlocked state (Fig. 2) the front area of its bolt head carrier 13 protrudes bit above the front area of the bolt head 11. In this way a cartridge can be conveyed up without getting its base caught on a cartridge extractor or on a projection of the front area of the bolt head 11. The bolt head 11, which as a result of this is not subjected to stress, also does not have the tendency to lock “in transit”.

As can be seen in Figure 6, in departure from custom the bolt head 11 in this embodiment exhibits two opposed cartridge extractors 61. One such cartridge extractor 61 is shown enlarged in Figure 7. As can be recognized, it exhibits a hook-like formation with a hook surface 63 turned toward the rear, which is meant for the purpose of sitting on the border of a shotgun cartridge from the front. This border is curved to the front and the outside, so that the hook surface 63 is seated on a curved formation. Depending on whether the cartridge ejector (not shown) is arranged on the right or the left, the cartridge case is ejected to the left or

to the right. However, it is important that there be no eccentric longitudinal force or lateral force acting on the cartridge case when it is being pulled out, which could originate from a single cartridge extractor 61. Thus the perfect extraction of even very long cartridge cases is guaranteed. Not until the end of the return path of the breech does an eccentric force act on the cartridge case, which first effects its release by the one and then by the other cartridge extractor 61.

In other respects one only has to convert the ejector in the switch from right to left ejection. The two cartridge extractors 61 remain where they are.

A repeating firearm is represented in Figures 9-12. The previous Figures 4, 5.1, 5.2, 7, 8 and 9 also apply for this design.

The only partially shown repeating shotgun can be provided with a box magazine (Fig. 10, 11). The shotgun exhibits a barrel piece 1 with a center line or axis of the bore 37. In the rear part of this barrel piece a cartridge chamber 3 is constructed, to which at the rear an end section 4 of the barrel piece 1 connects. The end section 4 has a somewhat U-shaped cross-section open to the bottom and exhibits an axial, upper locking recess 5 and two locking notches 6 below. The latter are seated in the free ends of both legs of the U cross-section. About at half height of each U leg a groove 10 running parallel to the axis of the bore 37 is provided, in which a cartridge extractor 61 (Fig. 13) can run.

In the case of a cocked weapon the cartridge chamber 3 is closed to the rear by a bolt head 11. This bolt head 11 is passed through by a front vertical cross bore hole, which for its part holds a locking block 25. This locking block, as already

described above, exhibits at a right angle to the axis of the bore a reverse t-shaped cross section (Fig. 5); with a conical locking extension 7 on the free (top) end of the middle jamb and a locking finger 8 on each of the two ends of the (bottom) cross jamb.

In locked position the locking extension 7 engages in the locking recess 5 and simultaneously the locking fingers 8 engage in the locking notches 6.

All areas of contact are diagonal to the vertical, in order to make possible an effortless establishment and release of the engagement of the locking block 25 in the end section 4 of the barrel piece 1. However, the oblique angles of the areas are so low that the engagement is self-locking, that is cannot be opened by means of force on the bolt head 11 along the axis of the bore 37 to the rear.

The barrel piece 1 and bolt head 11 are consequently directly connected with each other during the shot and transfer the high initial forces immediately to each other. No other element is affected by the transfer of force. The barrel piece 1 can therefore be admitted with its rear end into a plastic case 2. The greatest occurring forces are namely not conducted into the case 2.

The bolt head 11 is seated on a bolt head carrier 13 (Fig. 12.1 and 12.2). The bolt head carrier 13 can be moved longitudinally around a certain distance relative to the bolt head 11. The bolt head carrier 13 exhibits: a longitudinal recess 54, a lateral recess in the area below the locking block 25 and a plane surface 59 behind the lateral recess.

To the front the lateral recess 53 is bounded on both sides of the longitudinal recess 54 by a nose 55 on either side,

said noses which protrude upward and downward and overhang the plane surface 59.

The locking block 25 is constructed in such a way that in its upper locking position the lower area of its cross jamb is flush with the lower area of the bolt head 11 (Fig. 10). In this position the bolt head carrier 13 can move back and forth below the locking block 25 and in the process the bolt head 11 and the locking block 25 can glide on the plane surface 59 of the bolt head carrier 13.

However, if the bolt head carrier 13 moves over the resting position shown in Fig. 1 to the rear, then its two noses 55 with their rear edges grasp the cross jamb of the locking block 25 on both sides and pull it down to lateral recess 53. This position is shown in Fig. 2. In this position the breech block 25 disengages itself from the end section 4 of the barrel piece 1. The bolt head 11 can now move to the rear relative to the barrel piece 11.

The unlocked bolt head 11 runs in its further backward movement into a guide (not shown) in the case 2 in such a way that the locking block 25 cannot move up.

In closing the bolt head 11 it runs into the rear end of the cartridge chamber 3 or cartridge base. The bolt head carrier 13 is then pulled further to the front or pressed by a breech-closing spring (only indicated schematically as direction of force). In the process a bevel 57 forming the rear wall of the lateral recess 53 subjects the locking block 25 to stress in an upward direction, thus shifts it upward in its forward motion, until finally the plane surface 59 engages the locking block 25 and the position of Fig. 1 is again reached.

In the bolt head 11 a rotary stripping block 27 is arranged behind the locking block 25 and approximately parallel to its middle jamb, said stripping block 27 which is secured by means of a catch 28 in its normal position (Fig. 10, 11, 13 and 8, 9). The stripping block 27 is held in a rear, vertical cross bore hole 23 in the bolt head 11.

The breech block 25 and the stripping block 27 are passed through by a firing pin 19 and each exhibit a bore hole 31 and 34 for this purpose.

The bottom end of the stripping block 27 is constructed as a hammer foot 51, which runs in a groove 49 open at the top with reverse T-shaped cross section in the head bolt carrier 13. In operating state, i.e. in the normal position, in which the hammer foot 51 engages the flanks of the groove on both sides and the stripping block 27 is held by its catch 28, a recess 35 of the firing pin 19 runs into a projection 36 in the bore hole of the stripping block 27. This prevents the firing pin 19 from falling backwards out of the bolt head 11 when it is in normal position. If the stripping block 27 after negotiating the catch 28 is turned by about an eighth turn, then the firing pin 19 can be removed to the rear. Since in this state the hammer foot 51 is still engaging the upper flanks of the groove 49, the bolt head 11 and the bolt head carrier 13 are still fitted together, while a replacement of the firing pin 19 can be performed. Not until a full quarter turn of the stripping block 27 (only possible after removal of the firing pin 19) is the hammer foot 51 released from the groove 49 and the bolt head 11 can be removed from the bolt head carrier 13.

The bore hole 31 in the locking block 25 passed through by the firing pin 19 is shaped as an oblong hole, which makes

it possible for the locking block 25 to occupy the positions of Fig. 1 and Fig. 2 (locked and unlocked) in spite of the presence of the firing pin 19.

The firing pin 19 exhibits a bulge 29 behind the oblong hole 31, while in the rear side of the oblong hole 31 at the bottom a complementary beveled recess 33 to the bulge 29 is constructed. The recess 33 and the firing pin bulge 29 are designed in such a way that the firing pin 19 can only submerge into the oblong hole 31 when the locking block 25 is located in its uppermost position (locking position of Fig. 10). In this position the firing pin 19 can submerge so deeply into the oblong hole 31 that its tip for igniting a cartridge can emerge from the front area of the bolt head 11.

If the locking block 25 is lowered, then the recess 33, due to its special shape, presses the firing pin bulge 29 back so far that the firing pin tip can no longer reach a cartridge. This ensures that a cartridge can only be fired when the bolt head 11 is sufficiently locked.

As described, bulge 29 and recess 33 hold the firing pin 19 loosely between two end positions; the beveled recess 33 of the locking block forces a withdrawal of the firing pin when unlocking. Consequently, as a rule a firing pin spring is unnecessary and therefore does not need to be provided.

A handle 65 is mounted to the bolt head carrier 13, which for example could be connected to a movable front shaft. A detachable lock could secure this handle in the front most position. The handle and with it the bolt head carrier are be moved back and forth to reload the weapon.

In pulling back the handle 65 the bolt head carrier 13 is pulled along to the rear, whereby it pulls the locking block 25 down with its noses 55 and via the block then carries the bolt head 11 along in its further backwards movement. In the process the rear end of the bolt head carrier 13 cocks the hammer of a known striking mechanism not shown here, and performs a loading motion. In the advance motion the locking block 25 is pressed back up again in the above described manner and supported from below by the plane, upper surface 59 of the bolt head carrier 13. It is completely unimportant whether the bolt head carrier 13 is located one millimeter further to the front or not. Side by side tolerances therefore have no influence.

One advantage of the shown breech 11, 13 lies in the fact that in its unlocked state (Fig. 11) the front area of its bolt head carrier 13 protrudes bit above the front area of the bolt head 11. In this way a cartridge can be conveyed up without getting its base caught on a cartridge extractor or on a projection of the front area of the bolt head 11. The bolt head 11, which as a result of this is not subjected to stress, also does not have the tendency to lock "in transit".

As can be seen in Figure 13, in departure from custom the bolt head 11 in this embodiment exhibits two opposed cartridge extractors 61. This corresponds with the cartridge extractor 61 of Figure 7.

Figure 14 shows a bolt head 71 which can be moved along two guide rods 73. This breech exhibits a breech block 75, on both sides of which an extractor hook 77 is mounted.

The extractor hook 77 is shown enlarged in Figure 16. It is for example stamped out of sheet metal and exhibits in total a somewhat T-shaped profile, whose middle jamb exhibits a bore hole 79 on the end. A rear leg 81 and a front leg 83 extend at a right angle to the middle jamb at its other end. The rear leg 81 bears an angular connecting piece 85 on its free end, which is intended for engagement in a spiral pressure spring (not shown). The front leg 83 bears the actual hook 87 on its free end, which exhibits a surface 89 turned toward the middle jamb, said surface 89 which runs at an acute angle to the extent of the middle jamb and therewith also at an acute angle to the breech block 75 (Fig. 15). The two extractor hooks 77 can each be pivoted around an axis, somewhat in the form of a retaining pin 91, which passes through the bore hole 79.

The breech 1 exhibits on both sides a longitudinal cross-piece 95 on whose outer side the corresponding extractor hook 77 is mounted. Each longitudinal cross-piece 95 exhibits an upper and a lower edge, which extend into the breech block 75.

Figure 15 shows the breech of Figure 14 in top view. The two hooks 77 are seated on both sides of a cartridge 93. Behind the breech 71 in the region of its return motion an ejector 97 is seated. This ejector 97 is shown broken and seen from above. Viewed from the front or from the rear, the ejector 97 exhibits a U-shaped cross-section. When the breech 71 returns, then one of the longitudinal cross-pieces 95 runs through the ejector 97. The two U-legs of this ejector 97 engage the corresponding longitudinal cross-piece 95 from above and below and extend with their ends into the breech block 75. Figure 17 shows the ends of these legs marked 99.

Since the cartridge or cartridge case 93 is held on the breech 71 by means of the extractor hooks 77 and is carried along

with it, it returns with the breech 71. The ejector 97 on the other hand remains stationary during this movement of the breech. In this way the longitudinal cross-piece moves through the two legs of the ejector 97 to the rear. When the breech block 75 gets to the ejector 97, then the base of the cartridge 93 runs into its end and is pressed against the (right) extractor hook 77. Due to the interaction of the round profile of the cartridge border with the beveled edge 89 (fig. 16) the extractor hook 77 is pressed back and the ejector 97 imparts a powerful thrust to the right part of the cartridge border, so that the cartridge 93 tilts around the left extractor 77 and is ejected.

Switching the ejector 97 to the other (left) side of the breech similar causes an ejection to the right.

The ejector 97 can be inserted into a longitudinal or transverse slot in the case of the weapon. The ejector can hold a component of the weapon or a pin in this location.

The shown parts belong to a large caliber semi-automatic rifle for shell cartridges whose overall length amounts to about 90 mm, but the case length is less than 30 mm. The caliber is 20 mm. All the figures show the same model; the reference symbols apply for all the figures.

The rifle exhibits a barrel 101 which is inserted into a power input part 104. The rear end of the barrel 101 is constructed as a cartridge chamber 103. The cartridge chamber holds the cartridge case 165 of a cartridge 163.

The power input part 104 forms a central anchoring element, to which not only the barrel 101, but rather also

a case, a sighting electronic unit, a sling carrier and an attachment (grenade launcher, automatic pistol etc.) can be fastened.

The power input part 104 is passed through by a bore hole via the locating bore hole for the barrel 101, said bore hole whose front part exhibits a smaller diameter, is constructed as bore hole 167 for the breech-closing spring pipe 160 and joins into a greater bore hole, which forms a gas cylinder 171. The transition between the two bore holes 167, 171 is beveled. This transition is connected to the barrel 101 by means of a gas intake bore hole 173, which extends at a right angle to it and joins into it at the end of the cartridge chamber 103.

In the two above named bore holes 167, 171 a one-piece pipe is seated, which is composed of two cylindrical pipe sections with variable diameter: one breech-closing spring pipe 169 and a gas piston 175. The breech-closing spring pipe 169 is adjustable, but essentially acts as a seal in the bore hole 167. The gas piston 175 is adjustable, but essentially acts as a seal in the gas cylinder 171. The recess between the two pipe sections 169 and 174 forms the active area of the gas piston 175. The gas piston 175 is extended to the rear in a single piece through a bolt head carrier 113.

The movable component made up of the pipe 169, the gas piston 175 and the bolt head carrier 113 is passed through by a bore hole open to the rear. The front side of the bore hole is closed. In this bore hole, a breech-closing spring locating bore hole, a breech-closing spring is seated which is not shown here, which is supported behind the shown arrangement in the breech. On the front side of the breech-closing spring pipe 169 (not shown here) a firing lever is applied,

by means of which the entire component 169, 175, 113 can be moved back, to be precise against the force of the breech-closing spring.

When the cartridge 179 in the cartridge chamber 103 is fired, powder gases penetrate through the gas intake bore hole 173 into gas cylinder 171 and via gas piston 175 press this entire component 169, 175, 113 against the force of the breech-closing spring to the rear.

In this way the bolt head carrier is moved back either by hand or automatically. It travels a straight-line path of motion, which runs parallel to the center line of the barrel. Longitudinal grooves in the case, which are not shown, guide the bolt head carrier, together with the guide of the breech-closing spring pipe 169 in the bore hole 167 and gas piston 175 in the gas cylinder 171 in the power input part 104.

A bolt head 111 is located behind the barrel 101 and therewith under the bolt head carrier 113. This bolt head can be moved together with the bolt head carrier 113 back and forth, however not alone. The movement distance is longer than the length of a cartridge 163. Also the movement of the bolt head 111 is guided by longitudinal grooves or cross-pieces in the case.

The bolt head 111 is passed through by a locking bolt 125, which has the shape of a vertical letter "I", whose vertical beam passes through a vertical bore hole 121 in the bolt head 111. This vertical beam ends below in a locking extension 107. A diagonally running, horizontal beam of the "I" ends on both sides in a locking finger 108. In the middle the horizontal beam exhibits a coupling projection 183 extending to the rear.

As Fig. 3 in particular shows, three abutments for the locking bolt 125 are constructed in the power input part 104, namely a lower abutment, a locking recess 105 forming a conical bore hole, whose middle lies on a vertical, which passes through the barrel center line, and two locking notches 106 symmetrical to this vertical. The locking notches 106 are seated in front of projections of the inner surface of the power input part 104.

If the locking bolt 125 is located in the lower position shown, the locking position, then it engages with the locking extension 107 into the locking recess 105, and the locking fingers 108 engage in the locking notches 106. The bolt head 111 is then rigidly locked in the power input part 104. This is the locking position of the locking bolt 125.

When the locking bolt 125 is raised, the locking extension 107 lifts up to the top out of the locking recess and the locking fingers 108 lift up to the top out of the locking notches 106. Now the bolt head 111 is unlocked and can move to the rear. This is the unlocked position of the locking bolt 125.

A firing pin 119 passes horizontally and centrally, relative to the barrel 101, through the locking bolt 125.

For this purpose the firing pin 119 passes through an oblong hole 131 in the locking bolt 125, so that it can move unhindered between the locked position and the unlocked position.

As can be seen in Figure 4, the firing pin 119 exhibits a recess or a bulge 129. In the locking bolt 125 the rear side of the oblong hole 131 is provided with a beveled edge 133 that extends from the rear and the bottom to the top and the front. This beveled edge allows the firing pin 119 to submerge into the locking bolt 125 from the rear when the locking bolt is in the locked position shown in the figure. When the locking bolt 125 moves up to its unlocked position, then the beveled edge 133 moves the bulge 129 of the firing pin 119 and with it moves the firing pin 119 to the rear. The firing pin can thus only reach its front most position when the locking bolt 125 is in its locked position, so that a firing of a cartridge 163 can also only take place in this position.

A spring, which is necessary for other weapons to push back the firing pin 119 is replaced here by the positive control which is realized by means of the beveled edge 133.

In the bolt head 111 a cross shaft 189 is further arranged behind the locking bolt 125, upon which an axial tilting lever 187 is pivoted. One leg of this tilting lever 187 engages the coupling projection 183; the other leg ascends to the bottom of the bolt head carrier 113.

In front of this ascending leg of the tilting lever 187 a descending locking projection 185 is constructed, whose front side exhibits a beveled edge 193 extending to the top and front.

This arrangement functions in the following manner:

In the locked position of the breech bolt 125 (lower position) the bolt head carrier 113 is in the front most position (Fig. 2). The locking projection 185 is seated above the locking bolt 125 and prevents it from being removed from its position. The location of the tilting lever 187 is such as can be seen from Fig. 1.

Now if the bolt head carrier 113 is moved to the rear by hand or through gas pressure, the locking projection 185 also moves to the rear and releases the locking bolt 125. Simultaneously the locking projection 185 runs into the vertical leg of the tilting lever 187 and turns it in the sequence (clockwise in the drawing). In the process the horizontal leg of the tilting lever 187 lifts the coupling projection 183 and consequently also the locking bolt 125. The upper part of the locking bolt 125 now falls into a coupling groove 191, which is constructed at the bottom side of the bolt head carrier 113 in front of the bevel 193. Simultaneously the locking projection 185 runs up to the upper leg of the tilting lever 187 and keeps it tilted, so that it keeps the locking bolt 125 in the top position, in which it engages in the groove 191. Consequently the locking bolt 125 follows the motion of the bolt head carrier 113 to the rear, and with it, compulsorily, the bolt head 111. In the process a (not shown) case formation engages the locking bolt 125 from below and prevents it from falling down. The described connection between the parts consequently is maintained.

When the bolt head carrier 113 returns to the front, then the bolt head 111 first contacts the rear of the barrel 101. Located here under the

sections 108, 107 of the locking bolt 125 are the recesses 106, 105 of the power intake part 104 (see Fig. 3). The locking bolt 125 can now drop down.

This downward movement is forced by the beveled edge 193 of the locking projection 185, which pushes the locking bolt 125 down in the ascent. Simultaneously the rear side of this locking projection 185 releases the tilting lever 187 so that it can pivot again into the position shown in Figure 1. Now the gas piston 175 constructed in one piece with the bolt head carrier 113 runs into the front end of the gas cylinder 171. The bolt head 111 is now locked. In the process the locking bolt 125 is located in its bottom position, in which the beveled edge 133 releases the firing pin 119.

The weapon is now ready to fire, if there is a cartridge 163 in the cartridge chamber 103.

As shown, the length of the cartridge case 165 is less than one third of the total return motion of the breech 111, 113. This means that the cartridge case 165 has already been completely removed from the cartridge chamber 103, even before the breech 111, 113 has been appreciably retarded by the breech-closing spring. The acceleration phase of the breech 111, 113 is however already completed, since the barrel 101 must be practically pressure-less when the cartridge case 165 has been completely removed.

In order to support the cartridge case 165 the breech block 181 of the bolt head 111 is therefore provided with a lateral cross-piece 195 at the top and at the bottom. It is more difficult to guarantee the lateral support of the cartridge case 165.

Reference is made here to Figure 4, which shows a horizontal section through the center of the bolt head 111. The bolt head 111 exhibits, on both sides and symmetrical to one another, two slot-shaped recesses 110, which run to the rear through a spring bore hole 197.

In one of the recesses 110 (the bottom one) an extractor hook 161 is inserted, upon which a (not shown) spring in the associated spring bore hole 197 acts via a tappet. The extractor hook 161 can be pivoted around a vertical axis. A supporting body 199 is seated in the other recess 110, which is also held by a vertical axis. This supporting body 199 is similar to the extractor hook 161, but it is a bit larger, so that it cannot move in the recess 110. Moreover, the supporting body 199, unlike the extractor hook 161, does not encompass the cartridge base of a cartridge 163 located in the cartridge chamber 104. In rearranging the ejection direction it is merely necessary to exchange the extractor hook 161 with the spring for the supporting body 199 and change the ejector (not shown).

Patent Claims

1. Small arm having a locked breech with a bolt head (11; 111) and a bolt head carrier (13; 113), characterized by the fact that the bolt head (11; 111) is passed through by a locking block (25; 125) which can move transversal to the direction of motion of the breech and which interlocks with locking projections over a large area when in the locking position.
2. Semi-automatic firearm, particularly in accordance with Claim 1, with a rigid barrel (1) with cartridge chamber (3), a bolt head (11) which can be locked opposite the barrel (1) and a bolt head carrier (13) which can be moved relative to the bolt head (11), against said bolt head carrier (13) which a breech-closing spring (9) is supported, whereby between the bolt head carrier and the bolt head additional, powerful springs (17, 41) are arranged, via which the heavy bolt head carrier supports itself upon the latter in the case of the bolt head being locked, characterized by the fact that the bolt head (11) is supported via the spring arrangement (17, 41) without any other mechanical stop on the bolt head carrier (13).
3. Semi-automatic weapon in accordance with Claim 2, characterized by the fact that the spring arrangement (17, 41) opposes the compression with a progressively, non-linear increasing force.
4. Semi-automatic weapon in accordance with Claim 3, characterized by the fact that the spring arrangement (17, 41) exhibits a powerful spring (17) and parallel to it a buffer arrangement (41) whereby the spring (17) has essentially linear characteristics and the buffer

arrangement (41) is not subjected to stress until the spring (17) has been partially compressed.

5. Semi-automatic weapon in accordance with Claim 4, characterized by the fact that the buffer arrangement (41) preferably consists of at least one stack of elastomer buffers with great hysteresis.
6. Semi-automatic weapon in accordance with one of Claims 2 through 5, characterized by a transition piece (39) via which the spring arrangement (17, 41) supports itself on the breech head (11) in a locked state.
7. Semi-automatic weapon in accordance with one of the preceding claims, characterized by the fact that the bolt head (11) is passed through by a firing pin (19).
8. Semi-automatic weapon in accordance with Claim 7, characterized by the fact that the bolt head (11) is passed through by a locking block (25), which in a locked position is freely passed through by the firing pin (19) and which in an unlocked state blocks the firing pin (19) in a withdrawn, inoperative position.
9. Semi-automatic weapon in accordance with Claim 8, characterized by the fact that the locking block (25) exhibits a bevel, with which it takes back the firing pin (19) in the inoperative position in the transition from the locked to the unlocked position.
10. Semi-automatic weapon in accordance with one of the preceding claims, characterized by the fact that the locking block (25) can move transversal to the bolt head (11) in and out of the locked state, and in the locked position falls into a recess (5) in a

- component (4), which is constructed with the barrel (1) in one piece or is rigidly fastened to it.
11. Semi-automatic weapon in accordance with Claim 10, characterized by the fact that
- the locking block (25) has a foot strip (8) with a front and a rear guide surface and the bolt head carrier (13)
 - is arranged on the side of the bolt head (11) turned toward the foot strip (8),
 - has a front and a rear carrier strip (55, 57) such that
 - the returning bolt head carrier in the advanced return movement with its front carrier strip (55) runs into the front guide surface of the foot strip (8) of the locking block (25), in order to extract the latter from the recess (5) and
 - in its closing motion with its rear carrier strip (57) runs into the rear guide surface of the foot strip (8) of the locking block (25), in order to force it into the recess (5), as well as if necessary into the locking notches (6)
 - whereby at least one each of the front or rear foot and carrier strips (53, 55, 57, 59) is beveled.
12. Semi-automatic weapon in accordance with one of Claim 2 through 11, characterized by the fact that it is a semi-automatic shotgun.
13. Repeating firearm, in particular in accordance with Claim 1, with a bolt head (11) that can be moved in longitudinal direction or in the direction of fire, a locking block (25) that can be moved transversal

to this, which for the purpose of locking the bolt head (11) can be inserted in recesses in said bolt head (11) and in the case of the weapon (1, 2), and a handle (65) for moving the bolt head (11) forward or backward as well as for inserting and releasing the locking block (25), characterized by the fact that a bolt head carrier (13) is provided that can be moved parallel to the bolt head (11) via an initial and final run and carries said bolt head (11) with it on the final run, and that on the bolt head carrier (13) at least one beveled surface (57) is constructed, which engages in an opposite surface on the locking block (25) in such a way that the locking block (25) is released or inserted when the initial run is made.

14. Repeating firearm, in accordance with Claim 1, characterized by the fact that the bolt head carrier (13) be able to be moved via a lost motion run prior to the initial run, in said lost motion run which the bolt head (11) remains locked.
15. Repeating firearm, in accordance with Claim 1 or 2, characterized by the fact that the case of the weapon (1, 2) is formed by the rear end of the barrel (1) or by a barrel retainer case as well as by a plastic case (2), and that the recesses (5, 6) are constructed in the case of the weapon (1, 2) on the rear end of the barrel (1) or in the barrel retainer case
16. Repeating firearm, in accordance with one of the preceding claims, characterized by the fact that the bolt head (11) is passed through by a firing pin (19).
17. Repeating firearm, in accordance with Claim 4, characterized by the fact that the bolt head (11) is passed through by a locking block (25), which in a locked position is freely passed through by the firing pin (19) and which in an unlocked state

blocks the firing pin (19) in a withdrawn, inoperative position.

18. Repeating firearm, in accordance with Claim 5, characterized by the fact that the locking block (25) exhibits a beveled edge (33), with which it takes back the firing pin (19) in the inoperative position in the transition from the locked to the unlocked position.
19. Repeating firearm, in accordance with one of Claims 13 through 18, characterized by the fact that the locking block (25) can move transversal to the bolt head (11) and in and out of the locked position and in the locked position falls in a recess (5) in a component (4), which is constructed with the barrel (1) in one piece or is rigidly fastened to it.
20. Repeating firearm, in accordance with Claim 7, characterized by the fact that
 - the locking block (25) has a foot strip (8) with a front and a rear guide surface and the bolt head carrier (13)
 - is arranged on the side of the bolt head (11) turned toward the foot strip (8),
 - has a front and a rear carrier strip (55, 57) such that
 - the returning bolt head carrier in the advanced return movement with its front carrier strip (55) runs into the front guide surface of the foot strip (8) of the locking block (25), in order to extract the latter from the recess (5) as well as if necessary from locking notches (6) and
 - in its closing motion with its rear carrier strip (57) runs into the rear guide

surface of the foot strip (8) of the locking block (25), in order to force it into the recess (5), as well as if necessary into the locking notches (6) whereby at least one each of the front or rear foot and carrier strips (53, 55, 57, 59) is beveled.

21. Repeating firearm, in accordance with one of Claims 13 through 20, characterized by the fact that it is equipped for shotgun cartridges or other cartridges with a caliber of more than 15 mm.
22. Repeating firearm, in accordance with one of Claims 13 through 21, characterized by the fact that instead of the handle (65) a point of application for an automatic loading mechanism is provided.
23. A cartridge ejection arrangement preferably for a rifle in accordance with one of Claims 2 through 22 with at least two cartridge extractor hooks (7) spring mounted on a movable breech or bolt head (1), which are preferably opposing each other, characterized by the fact that at least one stationary ejector (27) can be assigned to one or each of the cartridge extractor hooks (7) in such a way that that in the case of a returning breech or bolt head (1) the cartridge or cartridge case (23) is jointly extracted by all cartridge extractor hooks (7) and pivots around the cartridge extractor hook (7) and in the process is ejected to the side which doesn't have an ejector (27) assigned to it
24. Arrangement in accordance with Claim 23, characterized by the fact that two cartridge extractor hooks (7) opposing each other and one convertible ejector (27) are provided.

25. Arrangement in accordance with Claim 24, characterized by the fact that the ejector (27) exhibits two ejector projections (29), which are arranged on both sides of one of the two cartridge extractor hooks (7) and run in longitudinal grooves or along a cross-piece (25) of the breech or bolt head (1), which join in its breech block (5) on both sides of the cartridge extractor hook (7).
26. Arrangement in accordance with one of Claims 23 through 25, characterized by the fact that the cartridge extractor hooks (7) exhibit a hook-shaped end (17) with surfaces (19) turned toward the breech block, which, when the hook-shaped ends (17) encompass the border of a cartridge (23) in such a way that the surfaces form an acute angle to a plane parallel to the breech block, so that these surfaces (19) remove themselves from the middle of the breech block to the front.
27. Arrangement in accordance with Claim 26, characterized by the fact that the acute angle lies between 0° and 15° .
28. Arrangement in accordance with one of Claims 23 through 27, characterized by the fact that it is assigned to a shotgun or a weapon with a caliber of more than 15 mm.
29. Large caliber rifle with a central power input part (104), in particular in accordance with Claim 1, which holds the rear end of a barrel (191) and the locking abutments (105, 106) of a breech (111, 113), characterized by the fact that the barrel (101) exhibits a gas intake opening (173) in the power input part

- (104), and that a gas cylinder (171) is firmly joined with the power input part (104), which is joined with the gas intake opening (173).
30. Rifle in accordance with Claim 29, whereby the barrel (101) is provided with a cartridge chamber (103), characterized by the fact that the gas intake opening (173) is close to the upper end of the cartridge chamber and joins into a bore hole (173) in the power input part (104), which for its part joins into the front end of the gas cylinder (171).
 31. Rifle in accordance with Claim 30, characterized by the fact that the gas cylinder (171) is constructed in the power input part (104).
 32. Rifle in accordance with Claim 30, characterized by the fact that the bore hole (173) extends at a right angle to the direction of fire.
 33. Rifle in accordance with one of Claims 30 through 32, characterized by the fact that the gas cylinder (171) is seated above the cartridge chamber (104).
 34. Rifle in accordance with one of Claims 29 through 34, with a bolt head (111) and a bolt head carrier (113), characterized by the fact that the bolt head carrier (113) forms the gas piston (175).
 35. Rifle in accordance with Claim 34, characterized by the fact that a pipe (169) is firmly joined to the bolt head carrier (113) or in one piece with it, partially passes through the gas cylinder (171) and is passed through as an attachment pipe for a breech-closing spring.

36. Rifle in accordance with Claim 35, characterized by the fact that a loading handle is either joined to the pipe (169) or can be joined to it.
37. Rifle in accordance with one of Claims 34 through 36, characterized by the fact that a locking bolt (125) is passed transversal through the bolt head (111) and is pressed by the bolt head carrier (113) in its resting position into a safety position, in which it engages in constructions (105, 106) of the power input part (104) and as a result locks the bolt head (111).
38. Rifle in accordance with Claim 37, characterized by the fact that a tilting lever (187) is arranged in the bolt head (111), engaging on the one hand in the path of motion of the bolt head carrier (113) and on the other hand in the path of motion of the locking bolt (125) and in a movement of the bolt head carrier (113) pulls the locking bolt (125) from its resting position out of the constructions (105, 106) of the power input part (104).
39. Rifle in accordance with Claim 38, characterized by the fact that the pulled out locking bolt (125) engages in the bolt head carrier (113) so that with its movement the locking bolt (125) and with it the bolt head (111) is taken.
40. Rifle in accordance with one of Claims 37 through 39, characterized by the fact that the locking bolt (125) exhibits an oblong hole (131) which is passed through by the firing pin (119), the firing pin (119) exhibits a recess (129) behind the locking bolt (125), and the oblong hole (131)

exhibits a beveled edge (133) to the rear, which engages on the recess (129) of the firing pin (119) and pushes it back when the locking bolt (125) is pulled out of engagement with the constructions (105, 106) of the power input part (104).

41. Rifle in accordance with one of Claims 37 through 40, characterized by the fact that two recesses (110) are constructed in the bolt head (111) transversal to the locking bolt (125), in which from the rear a bore hole (197) for a set-bolt and a spring pressing it forward are constructed, that in one of the recesses (110) an extractor (161) which can be swiveled against the force of the set-bolt is inserted, and that in the opposite recess (110) if possible a supporting element (199) is inserted, which, opposite the extractor (161), laterally supports the base of a cartridge (179) or cartridge case (165).