

TRIGGER ARRANGEMENT

The invention relates to a trigger arrangement for an automatic weapon with shift-over to continuous firing. A trigger arrangement in principle according to the category is known from the G3 rifle, with

- a hammer with percussion spring which has a first and a second stop post and is movable between a relaxed position into a fully tensioned position,
- a movable breechblock which in its recoil moves the hammer out of its relaxed position into its fully tensioned position,
- a latch which is pressed by a latch spring against the hammer, grips behind the first stop post of this and holds the hammer in its first tension position, which lies near the fully tensioned position, and which has a continuation which engages into the breechblock in such manner that in its ready-to-fire front position it moves the latch against the action of the latch spring out of the engagement with the first stop post, a swingably mounted trigger which is pressed by a trigger spring into a front rest position, is bringable by actuation against the action of the trigger spring out of this rest position into a releasing position and has an engagement lug,
- a firing lever, which is mounted swingably and movably in longitudinal direction between a front and a rear position and is burdened by a spring arrangement in the direction of the front position as well as in one turning direction, which is counter to the swinging movement which the trigger covers in its actuation,
- which has on its front end a counter-post which is arranged for engagement into the second stop post of the hammer and holds this in a second tension position which is further remote from its full tension position than the first tension position,

- which in the movement of the trigger into its releasing position is moveable by its engagement lug out of the engagement with the second stop post, and
- which after the releasing of the engagement with the second stop post is in a position by action of the spring arrangement to be moved by means of a forward movement out of the action zone of the engagement lug, so that it can again pass into engagement with the second stop post, and
- a shift-over arrangement which prevents the re-establishing of the engagement of the firing lever into the second stop post, so that only the latch acts on the hammer and this is freed again each time if the breechblock is closed (continuous firing).

It is pointed out that, in the following, the position designations such as "above", "forward" etc. refer to a weapon which is in normal use position and the bore axis (barrel central axis) of which runs horizontally; "forward" lies in firing direction. A trigger arrangement consists in the simplest case of an impact piece with percussion spring which in the tensioned state is held by a stop which is releasable by a trigger.

A safety device which fixes at will one of the movable function elements of this trigger arrangement makes the mechanism more complicated.

Automatic weapons which are designed for the delivery of single firing have, in addition, a so-called interrupter, which interrupts the connection between the trigger and the impact piece or hammer immediately after the shot, when the trigger is still active from the past shot, but the weapon is already again ready to fire.

Coiling (Aufschiessende) automatic weapons also designed for the delivery of continuous firing have, furthermore an arrangement which after completed closing of

the breechblock automatically releases the impact piece, as long as the trigger remains activated in continuous firing position. Obviously, such a mechanism is complicated.

Trigger arrangements, however, should also have as few parts as possible, as well as being as functionally secure and durable as possible. Moreover, trigger arrangements should be insensitive to deficient care, fouling and weathering influences, as light as possible and their individual parts should be as simply and economically producible as possible.

In the case of a rapid-fire rifle, in which the trigger arrangement is located separately in a pistol grip, there is yielded, further, the difficulty that it is not the case, as, say, with automatic pistols, that other functional elements can be conjointly drawn upon, say the closing spring, which can be used simultaneously also as trigger spring.

Altogether, a trigger arrangement for a rapid firing rifle which is convertible at will to continuous firing and single firing and is equipped with a safety, is functionally and therefore also constructively so complex that a specialist, to whom after all it is known that the construction (or design) of such a trigger arrangements requires weeks, knows that even a slight change on one component involves unexpected and undesired interactions.

The initially mentioned, known trigger arrangement of the G3 rifle is, insofar as functional security and insensitivity to fouling are concerned, equal to all the demands. Also, as compared with other known trigger arrangements, it is also simple in construction, because it uses only wire springs, also relatively economical in the production.

As disadvantageous, however, there is found the following circumstance: In single firing the firing lever on its part is swung by moving of the trigger. In the process the firing lever frees the second stop post, so that the hammer strikes off. In the following shot the firing lever is pressed forward by springs, comes with its rear part free from the engagement lug lifting it and can, therefore, be swung in opposite direction again by another spring, so that with its front counter-post it can again catch up the second stop post. The hammer is tensioned during the breechblock movement and held in this position by the latch, until this is swung by the breechblock and thus frees the first stop post. Now the hammer with its second stop post falls into the aforementioned counter-post and in so doing presses the escape lever to the rear against the force of a spring. If now the trigger (Abzug) is released, then it swings forward and in the process is lowered with its engagement lug until this finally grips under the trigger lever which then--on its part thrust rearward by the second stop post of the hammer--runs up. A renewed swinging of the trigger now swings the trigger (firing) lever, which then again releases the second stop post, so that the described process takes place again.

In order to be able to deliver continuous firing, the trigger must be swung further, in order to swing the firing lever with its counter-post out of the movement zone of the second stop post of the hammer. In this case it is, of course, a matter of indifference what position the firing lever occupies, because it is no longer in a position to engage into the hammer. This is held only by the latch, and it strikes off, therefore, as soon as the breechblock is closed and in the process the latch is swung.

To be sure, the shot breaks (bricht) in single firing and in continuous firing in the same angular position of the trigger, but afterwards in the case of continuous firing the trigger must be swung still further in order to prevent the firing lever and the hammer for engaging in one another.

If now, say, the motility of the index finger of the rifleman is impaired by a thick glove, then there may occur the case that in continuous firing the trigger is not swung far enough, so that instead of a firing burst only a single short is delivered.

The rifleman is irritated that the rifle is shooting single firing, although continuous firing was dialed.

Proceeding from this state of the art, underlying the invention is the problem of further developing the known trigger arrangement in such a manner that it becomes still more dependable.

In particular the trigger path through which the trigger must be swung for individual and continuous firing is to be constantly the same.

Further, the weight is to be reduced as much as possible, the production simplified as much as possible and the cost expenditure reduced as much as possible.

This problem is solved according to claim 1 by the means that the shift-over arrangement has an engagement element which is bringable into engagement with the firing lever and prevents its forward movement.

The firing lever, therefore, in continuous firing is not, as with the known trigger arrangement, brought out of engagement with the hammer by its swinging movement and that of the trigger, but the engaging element prevents the firing lever from moving forward, as would be necessary in order to be effective as an interrupter. The position of the trigger is, according to the invention, the same as in single-shot firing.

Hereby there are eliminated not only the above-described disadvantages of the known trigger arrangement, but it also becomes possible to restrict the further movement of the trigger after releasing of the shot (so-called "Trigger-Stop"), whereby the hit performance of the rifle on delivery of precision shots can be improved.

There, according to the invention there is not chosen a fully new trigger construction, but the known construction is retained and through an additional engaging element is obstructed in its proper function. This leads, however, astonishingly, not to incapability of function, as one would have been able to expect, but, with exclusion of the above-explained faults, even still to an improved effect.

The spring arrangement of the known trigger arrangement acting on the firing lever is formed from two springs, of which the one swings the firing lever with the counter-post to the hammer, and the other-urges the firing lever forward.. This arrangement finds its basis in the necessarily long swinging path that the firing lever together with the trigger has to cover; furthermore in the requirement, after the releasing of a shot in continuous firing position not to obstruct a further swinging of the trigger.

With the invention in contrast, the swinging path of the firing lever is substantially shortened, so that the spring arrangement can now be formed only by a single pressure spring (claim 2), which is active between a place of the trigger underneath its pivot axis and a place of the firing lever in front of this pivot axis.

This pressure spring forms not only a constructive simplification, but it is also less exposed than the known spring arrangement, so that the risk of a fouling which could lead to a malfunctioning is clearly reduced. The pressure spring presses the firing lever forward and, with the counter-post, upward.

The engaging element can be constructed about as a pivot lever, which engages with a cam projection into the firing lever. Since the engaging element does not need to shift the firing lever in any way, but, with weapon tensioned and set for single firing, only shifts it in its movement path, for its actuation only a very small force is sufficient.

It is even possible to actuate the engaging element by an electromagnet which brings it about that, say, on switching-on of a searchlight mounted on the weapon, the weapon is shifted over automatically to continuous firing or with switching-on of an optical-electronic precision sight arrangement the weapon is shifted over automatically to single firing.

Preferably, however, the engaging element is constructed as a slider, since a slider can be mounted most easily in the trigger arrangement without disturbing the functioning of the latter (claim 3).

The slider can be constructed as a transverse slider with a push-button on each of its ends, which, according to choice of the firing type (single or continuous firing) overhangs the one or the other lengthwise side of the grip piece.

Preferably, however, the slider is coupled with the safety roller which is also provided in the known trigger arrangement and that there serves, besides for the securing, also for the firing choice (claim 4).

The slider can act on the cam of the roller only from underneath, in order thereby not to impair other functional elements of the trigger arrangement. Preferably, however, it surrounds the roller, which passes through a break-through in the slider (claim 5), so that between the cam arrangement of the roller and the slider there is created an

extremely stable, dependable connection. This makes it possible simultaneously for the slider to be constructed very narrow in its transverse dimension, so that it does not obstruct function elements, and contributes only little to the total weight of the weapon.

Insofar as the slider fully surrounding the roller engages into the pivot path of the hammer, it is sufficient to recess the rear side of the hammer correspondingly. Since because of the narrow slider also the recess of the hammer only needs to be small, its weight is hardly decreased, and therewith its functional capability is not impaired.

On the basis of the arrangements, as well as of the functional engagements, it is proposed as preferred further development of the invention, that at least the parts mentioned and the trigger, preferably, however, still further parts, such as, say, the latch, the fire cessation roller and/or the slider, be formed from plastic in which, if need be, metal inlays are embedded; thus, say, an impact body of metal into the hammer, which increases the mass, into the firing lever an insert that is seated on the engagement lug, and into the slider a plate which reinforces the engagement zones and stiffens the entire slider (claims 6 to 9).

The use of plastic which-ultimately was first initiated by the invention, leads also to a further aspect of the invention:

In the known trigger arrangement all the axes or shafts which make possible the swinging movement of the individual parts are seated in bores of a case of strong steel sheeting. This case is installed in the grip piece, on which the separate grip is mounted.

According to the invention it is now proposed (claim 10) to form this case from plastic, to construct it as the upper section of the grip piece and to mold the grip onto this case in one piece as lower section of the grip piece.

Such a plastic grip piece can be not only especially economical, but it is especially light and does not rust. Since such a plastic is stretchable within limits, the axes and shafts can be impressed into its bores executed with under-measure, with low expenditure of force, but are firmly and sealingly held there by the resilient material. There it is not necessary, as in the case of pass bores in steel parts, to maintain close tolerances. Likewise, such bores do not wear out after multiple pressing in and out of a shaft or axis.

There is yielded, therefore, an extremely economically producible, resistant and simultaneously light grip piece, which, furthermore, requires virtually no care and which is suited, to be sure, especially for the trigger arrangement of the invention, but also for other trigger arrangements.

This grip piece according to the invention is especially well suited for the trigger arrangement of the invention, because in this the forces which are transmitted from the axes or shafts onto the plastic material of the grip piece are slight.

Here, according to a preferred further development (claim 11) the percussion spring arrangement that acts on the hammer is not constructed as a spiral pressure spring which is supported in each case by a counter-support on hammer and case, as in the category forming spring arrangement. The percussion spring arrangement is formed rather by two wire-shank springs, each of which resembles a clothespin spring with two shanks and a spiral section which is seated on a hammer shaft stub which is formed in

one story with the plastic hammer and is traversed by the hammer axis. The shanks facing one another are supported in each case on a lateral projection or a development of the hammer. The free shanks on each outer side are supported on projections or corresponding developments in the interior of the plastic grip piece. Each of these developments is burdened only with half of the total spring force. This burdening can be lowered, furthermore, by the suitable choice of the shank length to a value that does not exceed the fatigue strength of the plastic material of the developments.

The two shanks facing one another can also be connected by a crossbar that lies against the hammer.

By the force of the two springs, distributed and reduced in consequence of the long shanks, the hammer is dependably driven, without a load being brought up on plastic parts exceeding their strength.

Further features of the invention, for which protection is sought, in part, if need be, also separately, are to be learned from the further claims.

The object of the invention is explained in more detail, by way of example in the appended schematic drawing; in this:

Fig. 1 shows a longitudinal section through an example of execution of a trigger arrangement according to the invention, which is tensioned and secured, with a part of the breechblock,

Fig. 2 a longitudinal section through the trigger arrangement of Fig. 1 on a smaller scale, but in the firing position "single firing", with retracted trigger and with hammer that has just struck off, still before the recoil of the breechblock has started,
and

- Fig. 3 a longitudinal section through the trigger arrangement of Fig. 1 on a smaller scale, but in the firing position "continuous firing", with retracted trigger and with hammer that has just struck off, still before the recoil of the breechblock has started,
- Fig. 4 a partial longitudinal section through a preferred variant execution of the trigger arrangement of the invention, without representation of the breechblock part of Figs. 1 to 3, on the scale of Figs. 2 and 3,
- Fig. 5 a broken-off section, as seen in the direction of the arrow X in Fig. 4.

In all the figures there is shown the same view of the preferred trigger arrangement according to the invention, to be sure in different operating stages; in the interest of better perspicuity, however, it is only in Fig. 1 that all the reference numbers are inserted, which, of course, hold also for the other Figs. 2 and 3.

There is shown a grip piece 1 of shaped, preferably pressure-cast plastic, the upper part of which is formed by a case substantially closed on all sides, on the underside of which there is molded a grip 3. In the case there is seated a trigger arrangement 5.

The grip piece 1 is mounted by means of two cross bolts (not shown) to the underside of a rifle housing (not shown), in which a breechblock 7 is movably arranged in such manner that after a shot or on actuation of a handle it moves out of the front end position shown, in which the rifle is ready to fire, on over the grip piece 1 and then again forward.

The breechblock has on its underside a groove extending in its longitudinal direction, the rear side of which is blocked by an interrupter 11.

From the rear, vertical surface of the breechblock 7 there protrudes the rear end of a firing pin 9.

Underneath the interrupter projection 11 there is borne in the case of the grip piece 3 a latch 23 of plastic swingable on a transversely running latch shaft 27. This latch 23 has a continuation 31 which extends over and in front of the latch shaft 27 into the groove of the breechblock 7 and is pressed upward by a latch spring 25. When the breechblock 7 occupies the front end position shown, then, to be sure, the interrupter projection 11 presses from above on the continuation 31 and presses it forward.

Above and behind the latch shaft 27 the latch 23 has a latch stop projection 29. This, in the position shown--in which the interrupter projection 11 of the breechblock presses the latch 23 forward--is moved forward.

Behind the latch shaft 27 there is arranged a hammer shaft 21, on which a hammer 13 is swingably mounted with its lower part. The hammer shaft 21, like the latch shaft 27, is received in the side walls of the grip piece 1.

This hammer 13 is pressed by two percussion springs 25, which are arranged on both sides of the hammer on shaft butts and resemble clothespin springs, out of the position shown in Fig. 1 into the position of Fig. 2 and Fig. 3. One of the percussion springs 25 is shown in Figs. 4 and 5.

The hammer 13 is made of a plastic into which a steel inset 15 is embedded, which imparts to the hammer 13 the required mass to strike with the required force against the firing pin 9.

The hammer 13 has on its underside a front, first stop post 17 and a rear, second stop post 19. Further, the hammer 13 has a depression between a steel inset 15 and the first stop post 17.

The hammer 13 can occupy a relaxed end position, which is shown in Figs. 2 and Fig. 3, in which it is arranged upright behind the breechblock 7 and drives-in the firing pin 9. The latch 23 at this point of time is swung forward by the interrupter projection 11 of the breechblock 7.

The hammer 13, when the breechblock 7 runs back, is swung by this to the rear and downward, until it reaches its fully tensioned position, in which it lies about horizontal and allows the breechblock 7 to slide over it. In this position of the breechblock 7 the latch 23 is swung to the rear and lies on the and lies on the outer circumference of the hammer 13 between the first stop post 17 and the second stop post 19.

When the breechblock 7 slides forward again, it again releases the hammer 13 which slides a little upward (counterclockwise in the drawing), until the latch-stop projection 29 falls into the first stop post and thereby holds the hammer 13 fast.

When the breechblock 7 now reaches its front end position shown in the figures, it presses its interrupter projection 11 against the continuation 31 of the latch 23 and swings this forward (counterclockwise in the drawing), so that the latch-stop projection 29 is pushed out of the first stop post 17 and the hammer 13 can strike off.

If the weapon is in the continuous firing position (Fig. 3), then the striking-off of the hammer 13 occurs unobstructed up to the position shown in Fig. 3, where the follow-up

cartridge (not shown) is ignited; its recoil and/or gas pressure then repeat the above-described recoil movement of the breechblock 7.

If the weapon is in the single-firing position (Fig. 2), then the hammer 13 moves forward only a little and falls with its second stop post 19 into the counter-post 47 of the firing lever 43 described further below.

Behind and under the hammer shaft 21 the grip piece 1 is traversed by a trigger axis 35, on which a trigger 33 is swingably borne, which consists largely of plastic.

The trigger 33 has a swung actuating lever which passes downward through a slot which is formed in the bottom of the box-shaped upper part of the grip piece 1; moreover it has a horizontal main body recessed from above, and on its rear side a security continuation 37 extending upward.

The rear end of the recess of the main body is blocked by a metal inlay which forms an engaging lug 39 and is lengthened outward for the formation of a support for a trigger spring (not shown).

This trigger spring is constructed as a two-shank clothespin spring, and is seated with its spiral section on a lateral shaft butt of the trigger 33 and is supported with its shanks on the bottom of the box-shaped upper part of the grip piece 1 and on the counter-support mentioned. This trigger spring presses, as usual, the trigger into the position of Fig. 1, in which it is not activated.

In the recess there is accommodated an elongated firing lever extending essentially in the lengthwise direction of the weapon, which has a cross-bore 45 which is penetrated

by the trigger axis 35. The cross-bore 45 is constructed as an oblong hole so that the firing lever 43 can be swung limitedly relatively to the trigger 33 and can move in its longitudinal direction.

The firing lever 43 consists largely of plastic and has only a metal spur admitted into this and pointing rearward, which to the rear forms the free rear end 49 of the firing lever 43 and on forward direction a projection 51.

The firing lever 43 and the trigger 33 have, facing one another, a blind bore in which there is seated a spiral pressure spring 53. The firing lever 53 runs from a place underneath the trigger axis 35 to a place in front of this and, accordingly presses the firing lever 43 forward and-upward relatively to the trigger 33.

The front point of the firing lever 43 forms the counter-post 47 ready mentioned above.

The function of the last-described elements is as follows:

If one proceeds from the rest position of trigger 33 and firing lever 43 shown in Fig. 1, then the trigger, under the burden of a trigger spring (not shown), is located in foremost position with its free-lying actuating lever. The hammer 13 grips with its second stop post 19 into the counter-post 47 and in the process under the load of the two percussion springs (not shown) presses the firing lever 43 against the action of the firing spring 53 to the rear, until the oblong hole 45 is seated with its front boundary on the trigger axis 35. The rear end 49 of the firing lever 46 is present here with spacing over the upper surface of the engagement lug 39 of the trigger 33.

If now the trigger 33 on the actuating lever is drawn to the rear for the delivery of a short (in the position of Fig. 1, to be sure, this is not possible, because a safety is in operation, which will be described later), then the trigger 33 first covers a free swinging path, until the upper surface of the engagement lug 39 of this trigger 33 strikes from underneath against the rear end 49 of the firing lever 43; the rifleman feels the "pressure point". If now the trigger 33 is further operated, then the engagement lug 39 lifts the rear end 49 of the firing lever 43 and swings this about the trigger axis 35. By this swinging movement the counter-post 47 is moved downward, until the second stop post 19 comes free and can run on over it--the hammer 13 strikes off. Since the breechblock 7 present in the foremost position holds the latch 23 forward (as already described above), the hammer 13 can strike against the firing pin 9 and release the shot. The trigger 33 in the meantime is held fast in its position by a so-called "Trigger-Stop" (which will be described later).

Since with struck hammer 13 the press the counter-post 47 to the rear second stop post 19 does not, the firing lever 43 is moved forward by the firing lever spring 53 until the rear end 49 of the firing lever has been moved forward over the engagement lug 39. Now the firing lever 43 can be swung by the action of the firing lever spring 53 (clockwise in the drawing), in which process the rear end 49 of the firing lever 43 drops in front of the engagement lug 39 of the trigger 33 into its recess 41. Simultaneously the firing lever 43 is pressed upward with its front end--the counter-post 47--until that counter-post 47 comes to lie against the lower outer contour of the hammer 13 between the two stop posts 17 and 39. This state, at the moment of ignition of the shot, is shown in Fig. 2.

If now, by the recoil of the breechblock 7, the hammer 13 IS again tensioned, then the second stop post 19 runs on over the counter-post 47 pressed resiliently against the

hammer 13 and grips behind this. When now in the forward running of the breechblock 7 the hammer 13 can again move a little forward, then the second stop post 19, by its engagement into the counter-post 47, thrust the firing lever 43 to the rear, until this strikes with its rear end 49 against the front surface of the engagement lug 39.

If the trigger 33 is now released, then it swings forward, the engagement lug 39 dips downward and the firing lever 43 is thrust rearward by the hammer 13 moving a little forward, in which process this hammer again occupies the position of Fig. 1. Now, by renewed actuating of the trigger 33 a shot can again be delivered, but because of the described manner of function of hammer 13, trigger 33 and firing lever 43, always one shot only.

Behind the trigger axis 35, about at the same height as the hammer shaft 21, a firing-cessation shaft 55 of plastic traverses the grip piece 1 in transverse direction. On the outside of the grip piece 1 there is formed on each end of the fire-cessation shaft 55 a safety- and firing-choice lever (not shown), by its shifting a certain rotary position of the firing-cessation shaft 55 is choosable.

Further, the firing-cessation shaft 55 consists of two separate length sections which by plugging together can be firmly locked-or clamped with one another.

Over the firing-cessation shaft 55 there is thrust untwistably a plastic ring (not shown) which has along its outer circumference two adjacently lying rest depressions, into which a stop finger (stop body 67) can fall into place, which (finger) is pressed by a stop spring 69 against the firing-cessation shaft.

The stop finger is formed on a stop body 67 which has an oval recess which surrounds the firing cessation shaft 55 and on the axis of which the stop finger lies which (finger) extends from underneath into the recess. In extension of the axis of the oval recess the stop body 67 has a spring guide rod for the stop spring 69.

The plastic ring with the three stop depressions establishes three rotary positions of the firing-cessation shaft 55, namely the position "Safe", the position "Single firing" and the position "Continuous firing". The plastic ring described, however can also be exchanged for a plastic ring provided with only two stop depressions if, say, the rifle is not to be arranged for "Continuous firing". In this case also the slider 61 described further below is also omitted.

In Fig. 1 the firing cessation shaft 55 is represented in the rotary position "Safe". In this rotary position, with trigger 33 not activated, the safety continuation 37 of the trigger 3 lies against the outer circumference of the firing cessation shaft 55 or is located just under this. If the trigger 33 is actuated then it cannot be swivelled or can be swivelled only inconsequentially.

The firing cessation shaft 55 has a safety recess 57. If the firing cessation shaft 55 is in the rotary position "Single firing" (Fig. 2) or "Continuous firing" (Fig. 3), then this safety recess 57 faces the safety continuation 37 of the trigger 33, and this can be swivelled so far, until the safety continuation 37 strikes against the bottom of the safety recess 57. This impact forms the "Trigger-Stop". In the case of a sharpshooter execution, along the shortened safety continuation 37 there can extend an adjusting screw accessible from underneath, which on its part strikes against the bottom of the safety recess 57 and serves for the fine adjustment of the "Trigger-Stop".

Further, the firing-cessation shaft 55 has in addition two cams 59 offset by about 90° to one another, which overhang the outer surface of the firing-cessation shaft 55. The cams 59 engage into the opening 65 closed on all sides of a slider 61 of plastic reinforced with sheet metal.

This slider 61 is an altogether about level part and it has, on the underside of its section provided with the break-through 65, a metal section protruding forward, which a downward protruding finger 63 with spacing behind its front end. Further, the slider 61 has an extension on the back side of the section provided with the break-through 65.

This extension is guided in a slot of a cross-wall of the grip piece 1. The forward-protruding metal plate section rests on the trigger axis 35, the finger 63 being arranged in the interspace between this and the projection 51 of the firing lever 43. Furthermore, the inner circumferential edge of the break-through 65 lies against the outer circumferential surface of the firing cessation shaft 55 and the ends of its cams 59 in such manner that the slider 61 is always held fast in its particular position, regardless of how the rotary position of the firing cessation shaft 55 may be.

As is evident from the comparison of the figures, the break-through 65 and the cams 59 are constructed in such manner that the slider 61 both in the rotary position "Safe" of the firing cessation shaft 55 (Fig. 1), as well as also in the rotary position "Single firing", occupies a front position in which the finger 63 lies from behind against the trigger axis 35. There it does not obstruct the forward movement of the trigger lever 43 required in each interruption process.

If the firing cessation shaft 55, however, is turned from the rotary position "Single firing" (Fig. 2) into the rotary position "Continuous firing", then the cams 59 engage into the break-through 65 and move the slider 61 so far to the rear that its finger 63 rests on the projection 51. The swinging movement of the firing lever 43 in the actuating of the trigger 33 for the releasing of a shot is not obstructed in the process.

If now the trigger 33 is actuated, then the firing lever 43 cannot be moved with its rear end 49 before the engagement lug of the trigger 33, because it is obstructed, in any forward movement, by the stop of the finger 63 of the slider 61 against the projection 51. Its rear end 49, therefore, remains lying on the engagement lug 39. The firing lever 43 remains, therefore in its tilted position and is therefore not in a position to fall with its counter-post 47 into the second stop post (19) of the hammer 13.

The hammer 13, accordingly, after the tensioning is held only by the latch 23, and only until this is swung away from the hammer 13 by the interrupter projection 11 of the hammer 13. The rifle fires, accordingly, as long as the trigger 33 remains actuated.

In order to make possible a compact structure, in which the lengthwise spacing of the hammer shaft 21 from the firing cessation shaft 55 is to be as small as possible, the hammer 13 is provided on its rear side with a recess which, with hammer 13 tensioned, takes up the outer front edge of the break-through 65 of the slider 61.

In Figs. 4 and 5 only the grip piece 3 and firing cessation shaft 55 are shown in longitudinal section; all the other parts are represented in plan view.

The variant execution represented in Figs. 4 to 6 has all the features of the form of execution of Figs. 1 to 3; of these features in common, in the following only those are described and emphasized in the drawing with reference numbers which are not represented in the preceding figures. Otherwise, the variant execution presents additional features which are described further below and are marked with reference numbers in the drawing.

Further, the trigger arrangement of Figs. 4 to 6 is shown in the continuous firing position between two successive shots; the trigger 33 is drawn to the rear and the hammer 13 is held in a tensioned position by the engagement of the latch 23 into the first stop post 17, which position is present only shortly before the end position reachable by the hammer 13.

In Figs. 4 and 5 one of the two percussion springs 25 is to be seen, which has a middle, wound section from which there proceed two shanks and which section is seated loosely on a shaft butt of the hammer 13. The one of the two shanks engages with its end into a counter-bearing on the hammer 13 and loads this counter-bearing and therewith the hammer 13 in its strike-off direction. The other shank grips with its end zone under a downward- directed continuation of the latch and loads this thereby in such manner that it is pressed with its latch-stop projection 29 against the hammer 13.

By this arrangement not only is a separate latch spring saved, but the force with which the latch 23 is pressed against the hammer 13 is dependent on the position of the hammer 13 and becomes especially high when the latch 23 is to engage dependably into the first stop post 17, within an extremely short time. If namely, say in continuous

firing, this engagement should erroneously once fail to be made, then the follow-up cartridge as a rule would not be ignited and the weapon, just when it should fire, would have to be loaded.

In the variant execution shown, by the percussion spring 25 there is always provided a sufficiently high force on the latch 23 when--same must fall in. If, however, the weapon provided with the trigger arrangement is not in use, but is being stored, then the hammer 13 is not tensioned, the force of the percussion spring on the latch 23 is correspondingly slight and all the involved components of the weapon are exposed at most only to low loads during storage of that weapon.

In each of the grip pieces 3 of both examples of execution shown, there is also present a breechblock catching piece 71 (provided with reference number only in Figs 4 and 6). Such a breechblock-catching piece has the purpose of holding the breechblock 7 (Figs. 2 and 3) open, after firing of the last shot, in order make the rifleman aware of this state of affairs. After the introducing of a full magazine as well as a brief retracting and letting go of the loading lever, the weapon is then again ready to fire (it is not necessary, as otherwise in loading, for the loading lever to be drawn back over its whole movement stretch).

The breechblock catching piece 71 has, accordingly, on its upper side, a forward-pointing finger which is moved for a distance upward by the follower (not shown) of the magazine, after removal of the last cartridge, as well as an upward point catching projection which, when it is lifted by this distance, extends into the movement path of the breechblock 7 and prevents this from moving again into its foremost position once it has been thrown back after firing of the last cartridge.

Further, the breechblock-catching piece 71 has an extension protruding downward from the grip piece, which extension serves as handle, in order to press the breechblock catching piece 71 upward also with magazine removed, in order to be able to hold the breechblock 7 open, say for the inspection of the barrel without disassembling of the weapon.

In the form of execution of Figs. 2 and 3, there is assigned to the breech/lock-catching piece a spring 24 of its own, which is seated in the front side of the grip piece and presses the breechblock-catching piece downward to prevent it from inadvertently holding up the breechblock.

In all the variant executions of Figs. 1, 2 and 3, however, there is provided a spring 73 allocated to the trigger arrangement, the front spring arm of which was extended and now acts on the breechblock-catching piece 71. This spring 73, like the percussion spring 25, is constructed as a clothespin spring, with a wound section from which two shanks lying about opposite one another project. The wound section is seated on a shaft butt of the trigger 33 or on a sleeve which is slid onto the trigger axis 35, there being present a slight play which permits the unobstructed movement of the trigger.

The front shank of the spring 73 is seated on a spring receiver 77 which is formed on the breechblock-catching piece 71 and burdens this latter downward.

This shank of the spring 73 is extended forward over the breechblock-catching piece 71 and is located with its end barely underneath a projection 75 which is formed on the grip piece 3 and is located over this shank end.

As is evident from Fig. 6, the spring receiver 7 in the breechblock-catching piece 71 is constructed with two recesses, with a first depression the distance of which from the horizontal extension of the lower surface of the projection 75 is only slight, and with a second depression in which this distance is greater and corresponds at least to the movement stretch of the breechblock-catching piece in its functioning. Between the two depressions there is present a section the distance of which from the horizontal extension mentioned of the lower surface of the projection 75 must be greater than the thickness of the spring shank.

If the shank of the spring 73 is seated in the one depression (in Fig. 6 the right side) in which a great distance to the horizontal extension mentioned is present, then the functioning of the breechblock-catching piece 71 occurs unobstructed as it is described above.

In many uses, however, such a breechblock barrier formed by the breechblock-catching piece 71 is undesired, say because mud or sand could pass into the interior of the weapon housing if the breechblock remains open. In this case, say with the aid of a thin screwdriver or a knife tip, the Shank end of the spring 73 is thrust out of the depression, the right side depression in Fig. 6, into the other or left side, deeper depression and set in place there. Now the breechblock catching piece 71 can no longer move upward, because the end of the spring shank seated on this grips only closely under the projection 75, so that the upward movement of this spring shank, and therewith also of the breechblock-catching 71 is prevented.

The shift-over between active and inactive breechblock barrier is brought about by the sliding back and forth of the spring shank between the two depressions and can be performed, for example, by the ordnance mechanic of the unit concerned according to

the requirements. Of course a weapon can also be delivered with a certain adjustment made on the part of the manufacturer.

In order to describe the further functioning of the spring, first of all some general remarks are appropriate:

As is well known, the accuracy in hits in precision shooting is the higher, the "softer" the trigger is, i.e. the lesser the force is that has to be applied for its movement to the rear. This force, which must also overcome the restoring force of the trigger spring, should be as slight as the handling and functional security of the weapon permit; an inadvertent, light touching of the trigger or an acceleration usual in usage which acts on the trigger, if the weapon, say, falls off a truck, must not, namely, touch off the shot, and the trigger spring must be capable under normal environmental conditions, always dependably to move the trigger into its foremost position.

Under aggravated environmental conditions (severe frost which allows grease or oil to harden in the weapon, severe fouling by fine sand or the like, however, sometimes the restoring force of the trigger spring is no longer sufficient in every case if this spring was designed primarily with a view to a soft trigger.

For this reason hitherto the trigger springs of military hand firearms have been designed in such- manner that their restoring force was still sufficient also under the severe conditions described, and, correspondingly the possibility was foregone of facilitating precision shots by a low restoring force.

In the variant execution of Figs. 4 to 6 there exists, however, the possibility of choosing the trigger weight or the restoring force according to the environmental conditions to be expected or according to the training state of the user.

The trigger arrangement has a trigger spring which, in the representations of the drawing, is covered by the trigger and, therefore, is not visible. It corresponds to the state of the art and is laid out in such manner that the trigger is "soft". There the restoring force of the trigger spring can be extremely light, because the trigger consists of comparatively light material (plastic), so that the mass forces evoked by accelerations against which the restoring force must act are slight.

In the operating state shown in Fig. 4, the rear shank of the spring 73 rests on the inside of the grip piece 3. Now the spring 73 lying alone in this position provides the restoring force which urges the trigger forward; the trigger is "soft". This operating state is chosen when favorable environmental conditions are to be expected, or when persons with special state of training (mountain troops, sharpshooters, etc.) are to use the weapon.

Over the rear section of the rear shank of the spring 73 on the side surface of the part of the trigger which extends to the safety continuation 37, there is formed a resilient spring support 79. The rear shank of the spring 73 can now be deflected upward under force-storing deformation of this spring 73, and be emplaced on the spring support. This shifting-over can be performed simply, for example, by the ordnance mechanic of a unit, say, by the means that he grips from above under the spring shank by means of the hook of a hook pin and raises it.

Now the spring 73 reinforces the restoring force of the trigger spring (not shown); the trigger becomes "hard".

This position of the spring shank is shown in Fig. 5; this setting will be chosen in the unfavorable environmental conditions described, or when the corresponding weapons are issued to a still inexperienced circle of persons, from which there cannot yet be

expected a safe handling of the weapon (for example, recruits). A desired adjustment can, of course, be made at the factory.

The two adjustments described above (effectiveness of the breechblock barrier, restoring force acting on the trigger (33)) can be made in an extremely short time by an instructed person with the simplest tool. The user of the rifle, however, is not in a position to do this, however, since even in inspecting the grip piece with the trigger arrangement he cannot find any kind of handle or the like, with which he might make an adjustment perhaps on his own. It is ensured, accordingly, that the rifle is always in the adjustment state in which it was issued (possibly after making of an adjustment).

The disengageable breechblock locking described or the switching-on at will of an additional restoring force on the trigger can be performed in common or separately also by themselves alone on a weapon which is not equipped with the trigger arrangement according to the invention, or with another trigger arrangement.

It is expressly pointed out that by "rifle" in the preceding there can also be understood a stroking-up rapid-firing pistol, a submachine gun or a stroking-up machine gun.



Claims

1. Trigger arrangement for an automatic weapon with shift-over to continuous firing, with
 - a hammer (13) with percussion spring which has a first (17) and a second (19) stop post and is movable between a relaxed position and a fully tensioned position,
 - a movable breechblock (7) which in its recoil moves the hammer (13) out of its relaxed position into its fully tensioned position,
 - continuous fire releasing arrangements (23) controlled by the breechblock (7), cooperating with the first stop post (17),
 - a swingably mounted trigger (33) which is pressed by a trigger spring into a front rest position, is bringable by actuation against the action of the trigger spring out of this rest position into a releasing position, and has an engagement lug (39),
 - a firing lever (43)
 - which is burdened swingably and slidably by a spring arrangement (53) toward the hammer (13),
 - which is arranged for engagement into the second stop post (19) of the hammer (13) and by actuation of the trigger (33) frees the hammer (13), and
 - which in the case of actuated trigger (33) and re-stressed hammer (13) is bringable by the spring arrangement (53) again into engagement with the second stop post (19), and
 - a shift-over arrangement (55, 61) which prevents the re-establishing of the engagement of the firing lever (43) into the second stop post (19), so that only the continuous firing releasing arrangement (23) acts on the



hammer (13) and this hammer is again freed each time when the breechblock (7) is closed (continuous firing), characterized in that the shift-over arrangement (55, 61) has an engagement element (61) which is bringable into engagement with the firing lever forward (43) and prevents the movement of the latter.

2. Trigger arrangement according to claim 1, characterized in the spring arrangement (53) is formed by a single pressure spring (53) arranged obliquely between firing lever (43) and trigger (33).
3. Trigger arrangement according to one of claims 1 or 2, characterized in that the engagement element is constructed as a slider (61) which grips behind the firing lever (43) present in the action zone of the engagement lug (39).
4. Trigger arrangement according to claim 3, with a firing cessation roller (55) which is preferably formed as a safety element, carries at least one cam (59) and extends substantially parallel to the pivot axis (21) of the hammer (13), characterized in that the slider (61) engages into a cam (59) of the firing cessation roller (55), and on rotation of the latter travels back into the continuous firing position.
5. Trigger arrangement according to claim 4, characterized in that the slider (61) has a break-through (65) which is penetrated by the firing cessation roller (55), lies with this break-through (65) from underneath on a cylindrical section of the firing cessation roller (55), and is seated on both sides of it from above on a guide.



6. Trigger arrangement according to any of claims 1 to 5, characterized in that the hammer (13), the firing lever (43) and the trigger (33) consist at least largely of plastic.
7. Trigger arrangement according to claim 6, characterized in that in the hammer (13) there is installed a percussion body (15) of metal, and/or that the part of the firing lever (43) seated on the engagement lug (39) of the trigger (33) is formed from a metal piece embedded in the plastic.
8. Trigger arrangement according to one of claims 6 or 7, characterized in that the firing cessation roller (55) with its operating levers constructed on both sides of its ends is formed from plastic.
9. Trigger arrangement according to any of claims 6 to 8, characterized in that the slider (61) is formed from plastic and has a metal plate admitted into this, which forms support and engagement sections and makes the slider resistant to bending.
10. Trigger arrangement in particular according to any of claims 1 to 9, in which all the elements of the trigger arrangement (5) are mounted in a case, the side walls of which have bores for the reception of axles and shafts (21, 27, 35) and which is arranged in the grip piece (1) equipped with a grip, characterized in that the case consists of plastic and forms the upper section of the grip piece A1) on the underside of which the grip (3) is applied as one piece.
11. Trigger arrangement according to claim 10, characterized in that the percussion spring is formed from two wire-shank springs each with a winding-form section



and two shanks, each winding-form section surrounds a hammer-shaft butt, the one shank in each case being supported on a development of the hammer (13) and the other shank in each case being supported on a development of the grip piece (1).

12. Trigger arrangement according to any of claims 1 to 11, characterized in that the continuous firing releasing arrangement has a spring-burdened engagement member (23), that to the hammer (13) there is assigned at least one and preferably two percussion spring(s) (25), which engages or engage with the one end in the hammer (13), and that the other end of the percussion springs or of one of the percussion springs is supported with spring-loading effect on the engagement member.
13. Trigger arrangement preferably according to one of claims 1 to 12, with a spring-burdened breechblock-catching piece (71) which is slidable out of a rest position in which the breechblock (7) is freed--by engagement with the follower (Zubringer) of a magazine--into a working position, in which it holds the breechblock in open position, characterized in that an adjustable blocking mechanism (73, 75, 77) is provided which holds the breechblock-catching piece (71) at will in its rest position.
14. Trigger arrangement according to claim 13, characterized in that the blocking mechanism is formed by an element (73) movable together with the breechblock-catching piece (71), which is movable between a position on the breechblock catching piece (71) in which it engages with blocking effect behind a projection (75) in an adjacent element, preferably - the grip piece (3), and another



- position in which, permitting, the movement of the breechblock catching piece (71), it is displaced with respect to the projection (75).
15. Trigger arrangement according to claim 14, characterized in that the element is a spring (73) which is formed by a shank which extends at least partially under the projection (75) and is layable in one of two laterally displaced depressions (77) with spring-loading effect, that are formed in the breechblock-catching piece (71).
 16. Trigger arrangement according to claim 15, characterized in that the projection (75) is formed on the side of the breechblock-catching piece (71) which faces away from the spring (73), and that the extended end of its shank extends beyond the depression (77) to under the projection (75).
 17. Trigger arrangement according to one of claims 15 or 16, characterized in that the projection (75) extends on beyond both positions of the shank of the spring (73), and that the depressions (77) are staggered according to the height, so that they are at a different distance from the level of the projection (75).
 18. Trigger arrangement preferably according to one of claims 1 to 17, characterized in that a spring (73) is bringable at will into engagement with the trigger (33) so that this is burdened by the spring (73) in the same direction as by the trigger spring.
 19. Trigger arrangement according to claim 18, characterized in that the spring (73) has a shank which is bringable at will into engagement in a spring receptacle (79) that is formed on the trigger (33), or is releasable from this and preferably is hingeable on or from this.



20. Trigger arrangement according to claim 19, characterized in that the shank of the spring (73) is supported in the released state- on the grip piece.
21. Trigger arrangement according to claim 20 in conjunction with claims 15 to 17, characterized in that the spring (73) is constructed as a spring with two shanks, of which the one acts on the breechblock-catching piece (71) and the other is bringable at will into or out of engagement with the spring receptacle (79).
22. Trigger arrangement according to claim 21, characterized in that the spring (73) is constructed as a wire spring, with a wound section which is seated on the trigger axis (35) from which the two shanks protrude.