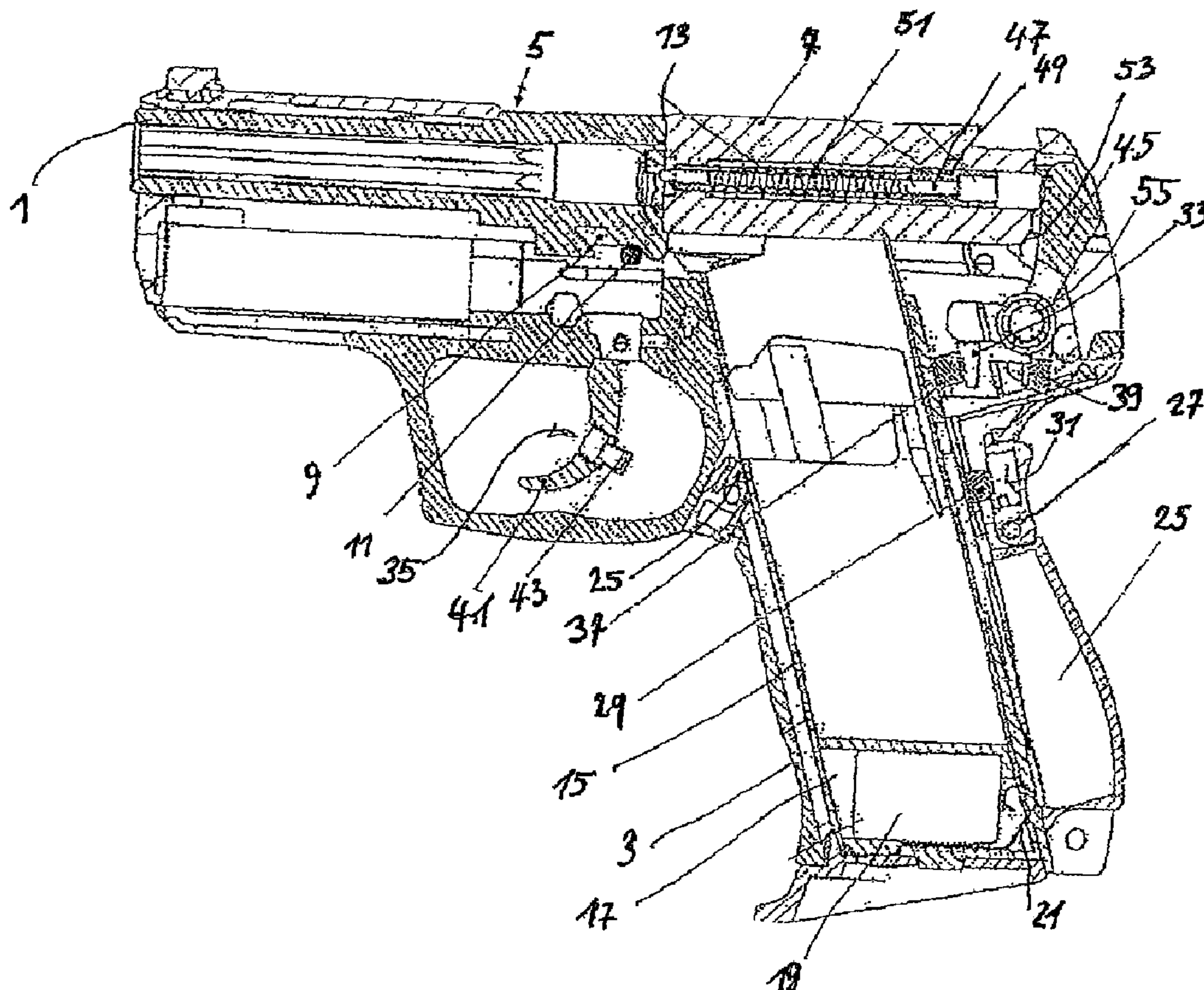




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(54) Titre : ARME DE POING A TIR AUTOMATIQUE
(54) Title: MULTIPLE-SHOT HANDGUN



(57) Abrégé/Abstract:

The invention relates to a multi-shot hand firearm which is used to fire cartridges which can be triggered electrically. The arm comprises an electric circuit which is used to generate the trigger voltage, a breechblock (7) and a firing pin (47) which is received



(57) **Abrégé(suite)/Abstract(continued):**

in the breechblock (7), whereby the tip of the trigger is arranged on the cartridge base of a loaded cartridge when the breechblock is closed (7). The arm comprises a pivotable contact lever (45), whereby the pivotable movement thereof is coupled to the movement of the breechblock (7) in order ensure that the arm functions in a safe manner, and is in electric contact with the firing pin (47) and with the electric circuit. The contact lever (45) is embodied in such a manner that it interrupts the electric contact between the electric circuit and the firing pin (47) when the breechblock is open (7).

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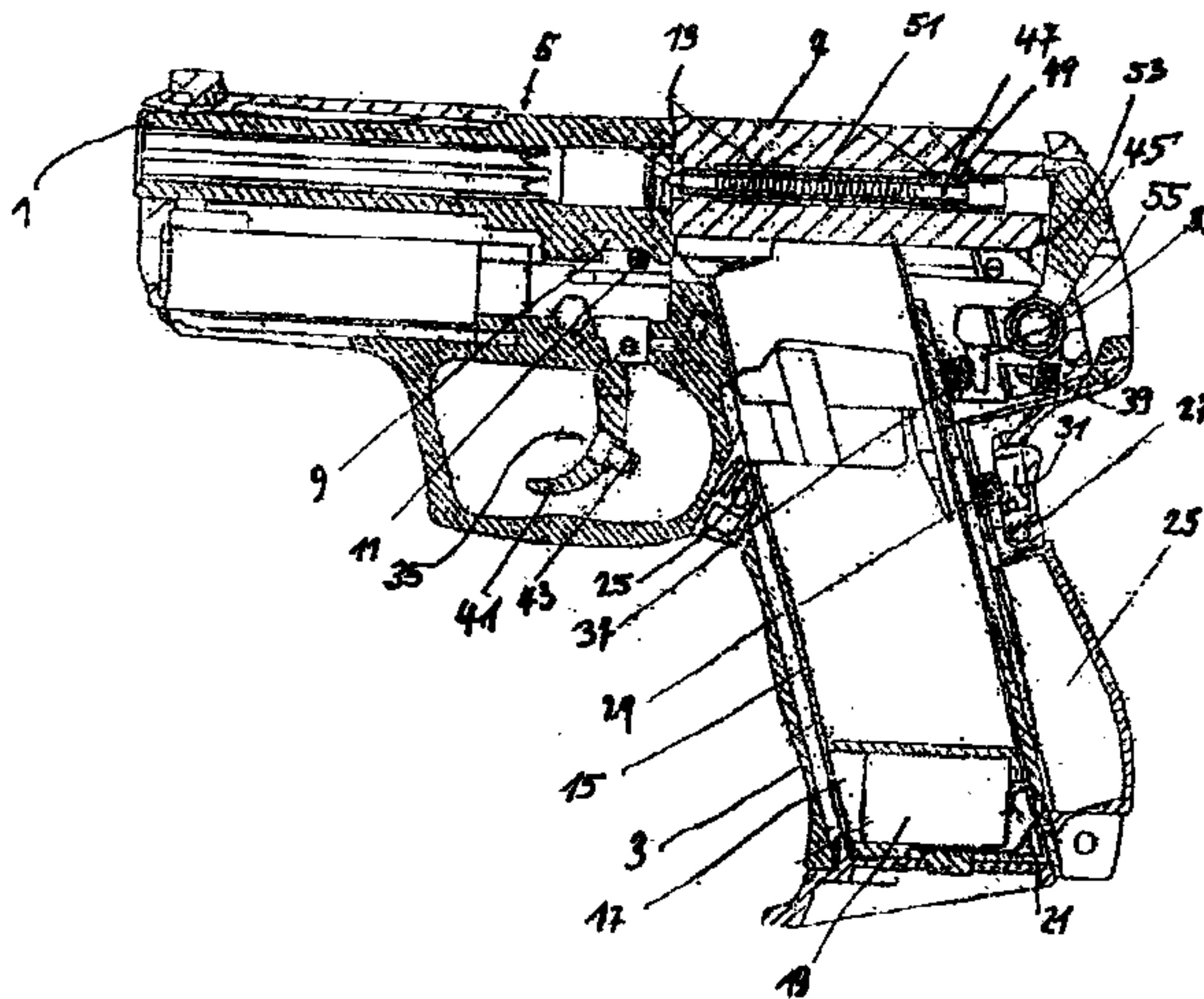
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(54) Title: MULTI-SHOT HAND FIREARM

(54) Bezeichnung: MEHRSCHÜSSIGE HANDFEUERWAFFE



(57) Abstract: The invention relates to a multi-shot hand firearm which is used to fire cartridges which can be triggered electrically. The arm comprises an electric circuit which is used to generate the trigger voltage, a breechblock (7) and a firing pin (47) which is received in the breechblock (7), whereby the tip of the trigger is arranged on the cartridge base of a loaded cartridge when the breechblock is closed (7). The arm comprises a pivotable contact lever (45), whereby the pivotable movement thereof is coupled to the movement of the breechblock (7) in order ensure that the arm functions in a safe manner, and is in electric contact with the firing pin (47) and with the electric circuit. The contact lever (45) is embodied in such a manner that it interrupts the electric contact between the electric circuit and the firing pin (47) when the breechblock is open (7).

(57) Zusammenfassung: Die Erfindung betrifft eine mehrschüssige Handfeuerwaffe zum Verfeuern von elektrisch zündbaren Patronen. Die Waffe umfaßt eine elektrische Schaltung zum Erzeugen der Zündspannung, einen Verschuß (7) und einen im Verschuß (7) aufgenommenen Zündstift (47), dessen Zündspitze bei geschlossenem Verschuß (7) am Patronenboden einer geladenen Patrone anliegt.

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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

Um eine sichere Funktion der Waffe zu gewährleisten, weist die Waffe einen schwenkbaren Kontakthebel (45) auf, dessen Schwenkbewegung mit der Bewegung des Verschlusses (7) gekoppelt ist, und der in elektrischem Kontakt einerseits mit dem Zündstift (47) und andererseits mit der elektrischen Schaltung steht. Der Kontakthebel (45) ist derart ausgestaltet, daß er den elektrischen Kontakt zwischen der elektrischen Schaltung und dem Zündstift (47) bei geöffnetem Verschluß (7) unterbricht.

Multiple-Shot Handgun

The invention relates to a multiple-shot handgun for the firing of electrically ignitable cartridges which exhibits an electric circuit for the generation of the ignition voltage, a breech and a firing pin held in the breech, whose ignition tip in the case of a closed breech rests on the cartridge bottom of a loaded cartridge (generic term of Claim 1).

Such weapons are well known, for example through DE 29 49 130, US 6 286 242, WO 98/55817 or WO 2004/010070.

When in the following positional terms such as “rear” or “above” are named without closer reference, then the weapon of the invention in normal firing position is meant, in which the muzzle is pointing to the front, the axis of the bore runs horizontally and the normal axis of the weapon is held vertically.

Attempts have been made for a long time to use electrically ignited ammunition in handguns also. The special advantage lies first in the fact that this ammunition will not be ignited by an inadvertent impact, as can take place for example in the case of an accidentally firing normal cartridge.

A further advantage is the fact that such ammunition is not widespread and cannot be produced with normal loading components or at least not without further ado. Unauthorized persons require therefore considerable time in order to procure such ammunition even in low quantity.

However, the previous efforts to construct such a weapon that is simple and reliable are disadvantageous. Long, failed signal lines and sliding contacts which can become soiled are the main disadvantages. Also, the creation of electric handguns which can be used for years like conventional handguns, which have a comparable supply of ammunition available and in addition are safer in function and cheaper in production than comparable conventional weapons has not been managed.

A self-loading pistol for example should be locked in order to be able to shoot a powerful cartridge, but should still be able to be charged with justifiable expenditure of force.

It is the object of the invention to find a multiple-shot handgun with electric ignition whose function is safer.

Accordingly, in a broad aspect, the present invention provides a multiple-shot handgun for the firing of electrically ignitable cartridges with: an electric circuit for the generation of the ignition voltage; a breech; and a firing pin held in the breech, whose ignition tip in the case of a closed breech rests on the cartridge bottom of a loaded cartridge, characterized in that the weapon exhibits a swiveling contact lever whose swiveling movement is coupled with the movement of the breech, and which is in electrical contact on the one hand with the firing pin and on the other hand with the electric circuit, wherein it is designed in such a way that it interrupts the electrical contact between the electric circuit and the firing pin in the case of an opened breech. The structure of such a weapon can be designed in such a way that it does not differ in exterior and in the general operation from a conventional weapon.

The contact lever in it is in particular similar to a hammer which is swiveled back from the already only slightly opening breech

and interrupts the circuit to the firing pin as soon as the breech has moved only a little to the rear. Hence the ignition contact is already interrupted before the weapon has released.

The contact lever can for its part lie within the weapon, as in the case of a “hammerless” pistol or a semi-automatic rifle, but can also be open on the rear side in order to reduce the overall length of the weapon – a pistol. However, since it does not need to be under tension, it also does not have to be accessible with the hand, so that if necessary it fills out a longitudinal slot on the rear side of the slide of a pistol, from which it only emerges during the reloading operation. The pistol accordingly does not exhibit, as for example a conventional hammer weapon, a projecting part (the hammer) on which the weapon could remaining hanging when being drawn or being used.

No sliding contacts whatsoever are assigned to the firing pin which could for example be damaged when taking the weapon apart, since the flow of current is produced via the contact lever which is stored in the grip or case and remains there when the weapon is being taken apart, as a hammer also.

Provision can be made that the contact lever is formed on its end resting against the firing pin in such a way that the firing pin is no longer touched by the contact lever when the breech is moving to the rear and with it no electrical connection exists any longer between these components. However, preferably the contact lever is pivoted on a swiveling axis on whose exterior in the region of this swiveling axis an electrically conductive point of contact is provided which cooperates with a sliding contact in such a way that the point of contact is only in electrical connection with the sliding contact when the contact lever is in a

swiveling position in which case the breech is closed.

Preferably the firing pin is electrically insulated with regard to the weapon.

Additionally or alternatively to the above discussed sliding contact the circuit can run between a loaded cartridge and the electric circuit preferably on the one hand via the firing pin and the contact lever and on the other hand via the breech, and the contact lever can cooperate with the breech in such a way that in the case of an opening breech the circuit is short-circuited via the contact lever. Also additionally or alternatively the contact lever and firing pin can be designed in such a way that in the case of an opening breech the electrical contact between contact lever and firing pin is interrupted.

In order not to impair the reloading operation the firing pin is preferably axially movable opposite the breech between two positions, wherein its ignition tip in the first position protrudes from the breech block of the breech and in the second position does not protrude from the breech block, wherein a firing pin spring pre-stresses it into the first position.

Preferably the contact lever lies in the case of a closed breech on the rear end of the firing pin and is pre-stressed against this end with a contact lever spring whose elastic force is greater than that of the firing pin spring. Hence the contact lever is loaded to the front by a spring like a hammer, so that after every loading operation it impacts powerfully on the firing pin (in the process if necessary removing oxide adhesion, dirt etc.) and forces the firing pin out against the force of the firing pin spring from the breech bottom. However,

no catches of any kind are assigned to the contact lever, as in the case of a conventional hammer, said catches which become contaminated or break. A hardening of the triggering or discharging of the shot due to a catch disturbance is therefore not possible.

Preferably the electric circuit exhibits a trigger detection device (e.g. in the form of a pushbutton switch or other proximity sensor) coupled with the trigger which activates the electric circuit in the case of a pulled trigger. The trigger exhibits accordingly only a simple "trigger" which triggers the shot so that the shot can be triggered without delay. In the process the release time is shorter than in the case of a conventional pistol, in which case after the triggering the free flight of the hammer or firing pin requires time which is longer than the time which is required to heat up the resistor in the electric detonator cap.

The electric circuit can require a certain time for the restoration of the ignition readiness, said time which can be set in such a way that it is longer than the time required for reloading. In the process provision can be made that the flow of current to the contact lever is either interrupted or not, depending on whether single-fire or bursts of fire are to be shot. The restoration time of the ignition state is in the process adjustable so that the cadence of continuous fire can be nearly randomly reduced. A continuous fire with a cadence of 150 shots per minute is possible without further ado, which even in the case of a pistol without stock makes possible a relatively precise continuous fire, when for example an opponent is to be kept in cover. Here however it is preferred that the electric circuit exhibits a release detection device (e.g. in the form of a pushbutton switch or other proximity sensor)

which activates the electric circuit only in the case of a released trigger.

By means of the provision of two in particular mechanically operated pushbutton switches for the trigger and release detection device, of which the one serves as a trigger and the other serves as a breaker, it is possible to make the function of the weapon simple and comprehensible so that conventional weapons mechanics can also repair failures. Finally in the case of manufacturing defects it is not necessary to change the entire electric circuit or electronics for each affected weapon, but rather it suffices to replace the corresponding element – the pushbutton switch or the trigger arm. Moreover the pushbutton switch can be placed in a place of the weapon where it can be well reached by a rod connected to the trigger, but create only very short line paths which in particular in the case of cleaning cannot or can hardly be reached and accordingly also cannot be damaged.

The trigger is namely preferably connected to a rod which leads to the rear and which exhibits an actuating means which activates the trigger detection device and the release detection device. As a result not only is an advantageous combination of mechanical and electrical features achieved, but rather the electric devices are also concentrated in the region of the release lever so that other regions, as usual, can be filled with the magazine.

In the process the rod does not have to perform additional swivel movements, as in the case of breakers of specified conventional pistols, but rather only a simple forward and rear movement so that one error source is eliminated which in the case of conventional pistols lies in the two-dimensional mobility of the rod.

In other respects the rod can also be made of plastic, since it only has to transmit information (opening and closing of the pushbutton switch), but no forces like the tensile force in the case of cocking of a conventional hammer in the case of trigger cocking operation.

This property of the rod is supported by the fact that a trigger spring is arranged on the trigger which guides the released trigger back to the front position, in particular however not on the rod. The rod therefore follows forcibly, but unloaded by the movement of the trigger which is, as usual, pressed forward by the trigger spring.

The trigger can, when it is pressed forward by the trigger spring, be moved against its force to the rear so far until ultimately the shot fires. However, it is preferred that a thrust piece directed to the rear is arranged in the blade of the trigger, which in the case of actuating of the trigger over an initial distance rests against the grip and then only permits a further actuating of the trigger over a short distance and under increased elastic force. The thrust piece serves therefore not only the purpose of setting the precise assignment of trigger and pushbutton switches, which hence can be mounted firmly and without possibility for adjustments, but rather the thrust piece also provides the trigger slack, that is the increase of the trigger force immediately before the firing of the shot. Also the trigger force and/or the remaining trigger path after the reaching of the trigger slack can be set, and to be precise in the simplest case by rotation of the thrust piece within a tapped hole in the trigger blade. If the weapon for instance falls into the mud, the complete operativeness of the trigger device can be immediately restored by simple wiping behind the trigger.

Preferably the distance of the trigger actuation to the beginning of the increased spring force is adjustable so that it can be selected whether the trigger slack begins later or earlier after the start of the trigger actuation, or whether the shot falls immediately or not until after a further pulling, after reaching the trigger slack.

The spring force is also preferably adjustable, and with it the hardness of the trigger slack. In the process the adjustment work does not require the taking apart of the pistol, but rather can be performed in minutes by a weapons mechanic by adjustment of the thrust piece.

It is simplest to provide a battery with sufficient voltage which suffices for ignition of the cartridge. The invention thus provides that the electric circuit exhibits a battery with an output voltage which is lower than the voltage required for triggering a shot, and a transformer circuit which transforms the output voltage of the battery to the voltage required for triggering a shot. Thus it is highly improbable that an accident, for instance the driving of a tank over the weapon, which could produce contact, actually triggers a shot. It is more important that in the case of a weapon with an individuality safety an authorized person can bridge the electronics, but that this bridging does not suffice to trigger a shot.

Preferably the electric circuit exhibits an identification device for identification of the marksman holding the weapon, said device activating the electric circuit after identification of the marksman. This can be completely freely selected as long as it is able to put the electric circuit in and out of readiness,

for instance a simple receiver which cooperates with a sender on the wrist of a marksman.

Basically a switch is required with which the weapon will be activated immediately before the shot, such as for instance a safety. While it is true that this function could be taken over by the identification device, however then the weapon would for instance always be ready to fire if it were loaded and taken e.g. in hand by an authorized marksman. Therefore preferably provision is to be made that the electric circuit exhibits a safety switch which upon actuation activates the electric circuit. Thus it can switch on the electronics so that said electronics hold the transformed or high-tension voltage ready and in the case of non-actuation causes the electronics to reduce the transformed or high-tension voltage without delay at least to the extent that no triggering of a shot is any longer possible with said voltage. The safety switch is hence not a simple switch which is electrically upstream from the contact lever and for instance sits in the breech, but rather the electronics is discharged in the safety position to the extent that the remaining current is no longer sufficient for igniting and only in the firing position is ignition current again provided via the electronics. This does not change the state of the pushbutton switch so that the weapon can be loaded and carried with the safety on in complete safety. After the releasing of the safety milliseconds suffice in order to produce the readiness to fire.

The safety switch can be designed as a lever safety or as a wing safety or as a compression safety. However, it is preferred that the safety switch is constructed as a grip safety pushbutton-rest switch and is assigned to a grip safety.

The grip safety could be arranged on the front side of the grip, like the cocking lever, which in the case of an earlier, mechanical pistol of the applicant provided for a high security, which exceeded the security offered by a safety. However, it is preferred that the grip safety pushbutton-rest switch is housed in the rear side of the grip, where it can be actuated by the part of the hand encompassing the weapon grip of a marksman which lies between the thumb and the index finger, similar to the safeties in use, for example of the ACP pistol. This not only has the advantage that the weapon is only ready to fire when it is taken properly into the hand, but rather also in the case of a weapon with the magazine in the grip has the advantage that the safety switch is seated behind the magazine, thus in one line with the pushbutton switches and the contact lever, so that simple and short line paths are present.

Preferably the electric circuit is arranged in such a way that it applies an ignition voltage to the contact lever when it has been activated by the identification device, the safety switch and in chronological sequence first by the release detection device and then by the trigger detection device.

The accommodation of the battery is problematic; the pistol of WO 98/55817 for example proposes a magazine that is filled completely with the electronics and the power supply and only looks like a magazine, but no longer functions as such. It is definitely practical to easily remove the battery from the pistol, but the magazine is basically required for the loading of cartridges. Here the invention finds a compromise which consists in the fact that in the bottom side of the magazine a battery room is recessed, said room which holds the battery. In

other respects the magazine can be filled with cartridges, like a conventional magazine. With this in the case of this electrically ignitable self-loading pistol the number of shots is not significantly lower than in the case of a conventional pistol. Also its exterior dimensions correspond therefore essentially to those of a conventional pistol, so that in the case of a government issue weapon of this type no training or at least only little additional training of the personnel equipped with the weapon is necessary. In the ideal case the marksman should not be aware of whether he is handling a mechanical or an "electric" weapon.

Here it is mentioned that in the USA civil self-loading pistols may only exhibit a supply of ammunition of ten shots, while a grip that is geared to the predominant anatomy of the hand can hold a magazine with up to fifteen 9 mm cartridges. Here space is available which can be filled with a rather large battery.

The battery is enclosed in the battery room in such a way that it cannot be removed without further ado. As a rule namely one battery suffices for the usable life of the pistol (some ten years). However if a pistol should be used quite often for firing position drills or the like, for instance in the training of soldiers, after a certain time a new magazine is easily necessary. Naturally the battery can however also be interchangeable. In an overall view however it is preferred that the battery room cannot be opened or can only be opened with a special tool, so that the contacts of the battery are not damaged by frequent removal and insertion.

The contacts for the transmission of current between the magazine and the weapon could be mounted somewhere on the sides or the top side of the magazine. However, it is preferred that on the

rear side of the magazine room at least one contact connected to the battery is provided with which a counter contact arranged in the magazine well cooperates. Normally the magazine and the grip will consist essentially of plastic; in this case at least two contacts are provided. However, several contacts can also be provided when the battery or arrangement of batteries must supply multiple voltages.

Preferably the electric circuit is seated in the rear side of the grip preferably in a grip space, to be precise in the place at which in the case of a conventional pistol the firing pin spring extends with a firing pin spring centering rod. While it is true that the contact lever is also pre-stressed by its spring, said spring does not need to be as powerful as a conventional firing pin spring and is preferably designed as a torsion spring ("clothespin spring") which is arranged around the shaft of the contact lever and which supports itself on the case or on the contact lever. Thus in the rear side of the grip a space remains above the height of the magazine which, from top to bottom, is filled by the contact lever, of the group of trigger detection and release detection device, of grip safety and the electronics to which the current is from the front and the bottom, so that the contacts, the electronics, the grip safety pushbutton-rest switch, the group of trigger detection and release detection device and the contact lever are above one another in the named sequence. Thus the shortest possible current paths are produced, and to be precise in regions which are practically inaccessible and can only be reached by experienced weapons mechanics should the need arise non-destructively.

In order to prevent conventional ammunition placed in the weapon from being triggered by the impact of the firing pin in the case of forward motion of the breech mechanism or even only an impression from being

pushed into its cartridge bottom, the firing pin is preferably designed having two parts, with one top part turned to the cartridge bottom and one base part turned to the contact lever, said parts being connected to one another via a spring means, wherein the weight of the top part is less than that of the base part. The prevention of an indentation in the cartridge bottom without triggering a shot can in other respects also be required in the case of electrically ignitable ammunition. In order to ensure an absorption of the impact shock in the process the weight of the top part is preferably less than that of the base part by at least the factor 5, in particular for instance by the factor 8.

In the case of the design of the firing pin having two parts said pin can as described above be axially movable with regard to the breech. Alternatively however the firing pin can also be fixed in axial direction with regard to the breech.

The applicant reserves the right to tailor a separate protection device to this design of the firing pin having two parts, detached by the corresponding contacting of the firing pin via the contact lever.

The weapon can be a rifle, an automatic pistol, a submachine gun or the like. Preferably however the weapon is a self-loading pistol, which is nearly identical to a conventional pistol in its exterior, is operated practically precisely the same and which – at least in the civil version – also does not differ in the number of shots. Due to the lack of a locking and cocking mechanism, which requires the highest precision and is very susceptible to soiling, the pistol is simpler and with it more cost effective, without having to do without the ease of withdrawal in any way. In contrast even the first shot is triggered without prior cocking with easy withdrawal like all shots, however the pistol is, when the safety is on or

when it is not taken in hand, completely safe, because then no ignition voltage is present. Since the electronics increase the in and of itself insufficient voltage to a considerable value, e.g. from 6 volts to 60 volts, even in the case of a soiled weapon a triggering of a cartridge takes place, since the high voltage equalizes potential resistances.

Preferred exemplary embodiments of the invention will now be explained more closely with reference to the appended drawing, in which the figures show the following:

- Figure 1 shows a self-loading pistol in longitudinal section, which does not differ or hardly differs in exterior from a locked self-loading pistol;
- Figure 2 shows an enlarged weapon section in longitudinal section, said section showing the contact lever with its electric points of contact;
- Figure 3 shows the cooperation of the contact lever with the breech and the firing pin, and to be precise for a closed circuit (Figure 3a) and an opened and short-circuited circuit (Figure 3b); and
- Figure 4 shows an alternative embodiment of the contact pin in longitudinal section.

The pistol exhibits a barrel 1, which is loosely supported in a grip 3, so that it can in the case of a shot move to the rear over a certain distance and then tilt. For this purpose the barrel 1 grips upward, as known, to the ejector window 5 of a breech 7, while it exhibits on the underside a diagonal groove 9 extending to the bottom, with which it enters into engagement in the case of the backward movement with a stationary cross pin 11, is pulled to the bottom and secured there.

The rear side of the barrel 1 is locked by a breech block of the breech 7 as long as the barrel 1 is in horizontal position; after the tilting of the barrel 1 the breech 7 is released and, after having been initially accelerated by the recoil, now moves alone to the rear.

A magazine 15 is located in the grip 3, which holds the cross pin 11, said magazine from which the breech 7 after each return motion receives the upper cartridge (not shown) and feeds it into the barrel 1 in its closing travel.

The magazine 15 and the grip 3 are of normal length, but in the underside of the magazine 15 a space 17 is recessed so that not the full number of cartridges fits in the magazine 15, but rather fewer, for instance (in staggered storage) only ten cartridges. This is the highest permitted number of cartridges in the USA for small arms which are not government issue weapons. The space 17 which is required on account of the hand size of a marksman and with it remains in the case of these weapons in the grip 3 underneath the magazine 15 is not, as in the case of normal pistols, empty or filled by a massive block, but rather a battery 19 or power supply unit (accumulator, etc.) is seated in it with a specified output voltage, e.g. 6 V. Below on the rear side of the magazine 15 at least one contact spring 21 insulated from the magazine 15 protrudes. In the normal case two contact springs 21 are provided (only one shown), since the magazine 15 consists of non-conductive plastic.

The magazine 15 can be designed as a throw-away magazine which comes supplied with the ammunition loaded and is thrown away after use. The magazine space 17 can also be accessible and the battery 19 can be interchangeable.

In this case the marksman must however make sure that the battery 19 always has sufficient residual current for the emission of at least ten shots. The battery solution e.g. in the case of cameras has meanwhile proved itself to such an extent that there are hardly any cameras being sold which have a mechanical solution – empty batteries are no problem, since if necessary new batteries can be inserted prior to an important photo deadline. Precisely so a magazine 15 with a new battery 19 can simply be inserted into the pistol prior to each use.

However, it has turned out that at least in the case of military pistols the weapons are exchanged after a few decades, since then a specified proportion are worn out, and that often until the occurrence of signs of wear and tear often only a few shots are fired, when the frequent, relentless use in training or in guard duty causes damages. Also in the case of civil weapons it is desired that the weapon does not outlive the owner, since after said owner's death the legally acquired weapon can fall into unauthorized hands unchecked. Therefore it is preferred that the battery 19 without damage of the magazine 15 cannot be exchanged, as well as being equipped and such that it survives some decades as well as several tens of thousands of shots. The battery space 17 is large enough in order to hold such a battery 19, because while it is true that the ignition requires energy, this energy must only be provide for a very short time (some milliseconds). Batteries with such a storage capacity are available today.

In the rear side of the grip 3, where a powerful firing pin spring is usually located in the case of a mechanical, conventional pistol, a grip space 23 is provided on the underside, which lies opposite the contact springs 21.

Counter contacts (not shown) are located there which produce a flow of current with the contact springs 21 of the magazine 15. A conventional magazine holder 25, which holds the magazine 15 firmly in its position in the case of use, in order to guarantee a clean loading of the cartridges, also provides for a constant and clean current conduction from the contact springs 21 to the counter contacts (not shown).

The electronics (not shown) of the pistol are located in the grip space 23, said electronics being producible by an experienced electrician and which can be provided with the most various identification devices, for instance a receiver, which only responds to a sender in the armband of the hand of the marksman which is holding the weapon. The electronics include a structure which is similar to the electronics of a door opening device or an electronic flash in order to bring the battery voltage to a considerably higher value. In this way it is ensured that an unauthorized person who bridges the electronics with their identification device that is present should the occasion arise cannot trigger any shot at all with the battery voltage alone.

The electronics are further designed in such a way that the achievable current surges can follow each other briefly, so that it is ensured that in the locking of the weapon after a shot there is also enough current available for the triggering of the next shot.

A grip safety 27 with a grip safety pushbutton switch 29 is arranged above the electronics, said grip safety being seated in the location of most conventional grip safeties and ensuring that it can only be closed when the pistol is properly enclosed by a hand. The grip safety 27 can be of any design and for instance be extended upward by a trail spade,

in order to prevent the hand from being injured by the returning breech 7. In the exemplary embodiment shown a massive arm-rocker lever arranged underneath is provided which is pressed to the rear by a (not shown) spring and which contains a release spring 31 which contacts the pushbutton switch 29 when the arm-rocker lever is completely compressed.

It is essential that the pushbutton switch 29 of the grip safety 27 is not simply a work switch which interrupts the ignition voltage and hence is similar to a trigger safety in its function. Instead the pushbutton switch 29 of the grip safety 27 emits a signal to the electronics which causes a transformer circuit part to generate a sufficient ignition voltage from the battery voltage when this pushbutton switch 29 is pressed. This ignition voltage is available e.g. 10 milliseconds after actuation (closing) of the pushbutton switch 29 and is again interrupted when the pushbutton switch 29 is opened, thus when the grip safety 27 is no longer under the hand of the operating person with sufficient security. Hence the grip safety 27 is similar to rare, but known mechanical grip safeties which do not cock the weapon until actuation, but require only an adjustable, if necessary extremely slight expenditure of force for their actuation.

While it is true that in the case of a throw-away magazine 15 or an interchangeable battery 19 the battery 19 required under circumstances for only 10 shots is irregularly large, until a shot is actually fired the weapon will possibly often be in the hand, ready to fire. For firing position drills it is therefore advisable to use an empty (already shot empty) magazine 15 or a special

practice magazine in which no battery 19 and no cartridges can be placed.

A release piece 33 is located above the grip safety 27 and its pushbutton switch 29, said piece being connected via a light rod (not shown) to the trigger 35, moving to the front when the trigger 35 is pulled and moving to the rear when the trigger 35 is released. In Figure 1 the release piece 33 is in the trigger position, the trigger 35 on the other hand is in the release position, in order to show the individual parts more closely. In practice such a position is not possible. The rod corresponds to the rod of a conventional (mechanical) pistol, but only the trigger spring (not shown) needs to be overcome in order to build up resistance to withdrawal; the rod itself actuates in each of its two end positions only a micro switch 37, 39. Therefore an elastic thrust piece 43 is integrated in the trigger blade 41, said thrust piece which does not impair the front contour of the trigger blade 41, but which is to the rear in order to rest against the grip 3 when the trigger blade 41 has been pulled through. However, against a simple limitation of the trigger path (so-called "trigger stop") the thrust piece 43 contains a compression spring (not shown) which in the case of the resting of the thrust piece 43 against the grip 3 brings about a sudden increase of the trigger force, whose beginning one however refers to in general as "trigger slack". After that the trigger blade 41 still has to continue to be moved a short distance under increased trigger force until the rod (not shown) rests the release piece 33 against one of the micro switches 37, 39 (trigger switch 37) and said switch is closed.

The other of the micro switches 37, 39 (breaker 39) is actuated upon the release of the trigger blade 41 or in the case of its complete movement to the front and must be actuated in any

event if the trigger switch 37 is to be active and have current supplied to it.

The pistol has one component that looks like a hammer, but which is actually a contact lever 45, which however is shaped similar to a hammer and like a hammer is brought into a cocking position by the breech 7, in which it however does not remain, but rather moves to the front again after each shot and in the end, not until the breech 7 is completely closed, loads a firing pin 47 which is then pressed out a little from the breech block 13 of the breech 7. For this purpose the contact lever 45 is provided with a powerful torsion spring, similar to what is used with clothespin springs, which presses it forward. The named torsion spring has no influence whatsoever on the trigger 35, which also has no catching or other resistances whatsoever to overcome, said resistances being necessary to function in the case of conventional, mechanical pistols.

The firing pin 47 is narrowly enclosed by an insulation sheath 49 which is firmly connected to the firing pin 47 or alternatively to the breech 7 and which surrounds the firing pin 47 over its entire length. A weak firing pin spring 51 presses the firing pin 47 to the rear.

If a shot is fired, then the recoil drives the breech 7 and the barrel 1 to the rear until, as already mentioned above, the barrel 1 tilts and in the process releases the breech 7, which returns alone all the way to the rear. At the beginning of the joint backward movement of barrel 1 and breech 7 an edge 53 of the breech comes to rest on the contact lever 45 and begins tilting it to the rear, as shown in Figure 3b. In the process it lifts from the firing pin 47 so that the firing pin 47, driven by the firing pin spring 51, can move a bit to the rear opposite the breech 7. Thus the ejection of the

cartridge case and the loading of the new cartridge take place unhindered, since the firing pin 17 no longer protrudes from the breech block 13.

The contact lever 45 is pivoted on a swivel axis 55. Its exterior is electrically insulated at least in the region of this swivel axis 55 to the greatest extent by an insulating ring 57 that is not completely rotary. Only a precisely arranged point of contact 59 electrically conducting outward is provided there, which cooperates with a sliding contact 61 (Figures 3a, 3b) in such a way that the point of contact 59 is only electrically conductively connected to the sliding contact 61 when the contact lever 45 is located in its swiveling position in which case the breech 7 is closed and the firing pin 47 is pressed out of the breech block of the breech 7 by the contact lever 45 (Figure 3a). In all other swiveling positions the circuit is interrupted there (Figure 3b).

The sliding contact 61 with the point of contact 59 can in the process be provided alternatively or in addition to the above variant, in which case the contact lever 45 is formed on its end resting against the firing pin 47 in such a way that the firing pin 47 in the case of the breech 7 moving to the rear is no longer touched by the contact lever 45 (since as shown in Figure 3b it is lifted by the breech edge 53 from the firing pin 47) and with it no electric connection exists any longer between these component parts. Not until the breech 7 is closed again does the contact lever 45 lie upon the firing pin 47 and presses it forward (Figure 3a). If the pistol for any reasons is insufficiently locked or not locked at all, then the mentioned edge 53 of the breech 5 prevents the contact lever 45 from touching the firing pin 47. Additionally, before the contact lever 45 is lifted from the firing pin 47, the rear section of the

breech 7 can come into electrical contact with the firing pin 47 either directly or indirectly (via the contact lever 45, which in the case of a returning breech 7 for a short time both rests both on the firing pin 47 as well as also on the breech 7). In the process the electrical circuit is short circuited, which for ignition of the loaded cartridge runs from the electric circuit above contact lever 45 and firing pin 47 to the cartridge bottom and from the cartridge above the breech 7 back to the electronics, and in the process the required ignition voltage stored in a capacitor is for example rapidly discharged.

The electronics emit only one single current surge, after whose emission the trigger 35 must again be released to the front. Once it has arrived in its front most position the release piece 33 contacts the circuit breaker 39, and said circuit breaker puts the electronics into a state in which it prepares a second shot, provided the pushbutton switch 29 of the grip safety 27 remains pressed.

Prior to the firing of each shot the circuit breaker 39 is to be actuated. Thus among other things this prevents a shot from being discharged when the trigger 35 is pulled and in the process is charged.

The "trigger weight" is only predefined by the trigger spring and the thrust piece 43 and can be freely selected within reasonable limitations. A catch is not to be overcome. The contact lever 45 can be light because the force with which it presses on the firing pin 47 is given by its torsion spring alone. The shot takes place more rapidly after the triggering than in the case of a mechanical weapon, since in the case of said mechanical weapon the released hammer still has to cover its striking path, while in the case of the shown pistol ultimately the electronics and trip voltage determine when the shot takes place. Also the load moment of a hammer does not disturb

the shooting accuracy because only a relatively light contact lever 45 is present which at the time of the release has been stopped for a long time so that no load moment occurs or the load moment is slight.

While it is true that the triggering voltage is rather high (about 60 Volts), said voltage is however harmless, since it is only present for a short time. Thus the contact lever 45 can also – regardless of the ranges of its point of contact to the sliding contact 57 – be uninsulated, since it only receives a current surge when said pistol is currently being fired and one would have been injured already by the returning breech if one had one's hand directly behind the contact lever 45 at this time.

Figure 4 shows an alternative embodiment of the firing pin 47 which is designed in two parts here. It is composed of a front tip 63 turned to the cartridge bottom and a rear base rod 65 turned toward the contact lever 45, said parts being connected to each other in longitudinal direction via a cylindrical spiral spring 67. For this purpose the spiral spring 67 is supported on the front end of the base rod 65 and on a projection 69 of the tip 63, said projection 69 being guided with its tail 71 a specified length into the cylindrical spiral spring 67. This length is dimensioned in such a way that the tail 71 serves as a path limitation for the movement of the tip 63 into the breech 7. The mass ratio between base rod 65 and tip 63 is such that the tip 63 hitting the cartridge bottom in the case of the moving forward of the breech 7 does not leave behind any impression worth mentioning there. For example the mass ratio is at least 5 to 1, in particular 8 to 1. Correspondingly the spring constant of the spiral spring 67 is selected in such a way that on the one hand the impact impulse in the case of the impact of the tip 63 on the cartridge bottom is essentially absorbed by the tip 63, thus not transferred to the base rod 63,

and on the other hand in the case of the tip 63 resting on the cartridge bottom a sufficient contact pressure is still guaranteed for the electrical connection. In the case of breech speeds of for example 3-4 m/s for example in the case of a tip mass of for instance 1 g and a base rod weight of for instance 8 g a spring constant of 1 N can be provided.

In the case of this alternative embodiment the firing pin 47 can also be axially fixed with regard to the breech 7, thus not permitting any relative movement in axial direction with regard to the breech 7. Since in this case the weight of the breech 7 firmly connected to the base rod 65 is added to the weight of said base rod 65, essentially only the tip mass and the spring constant are to be correspondingly selected so that the impact shock is sufficiently absorbed. Their values must be selected sufficiently low for this purpose, but still great enough in order to ensure the required contact pressure for the electrical connection.

1. A multiple-shot handgun for the firing of electrically ignitable cartridges with:
an electric circuit for the generation of the ignition voltage;
a breech (7); and
a firing pin (47) held in the breech (7), whose ignition tip in the case of a closed
breech (7) rests on the cartridge bottom of a loaded cartridge,

5 characterized in that

the weapon exhibits a swiveling contact lever (45) whose swiveling movement is coupled
with the movement of the breech (7), and which is in electrical contact on the one hand
with the firing pin (47) and on the other hand with the electric circuit, wherein it is
designed in such a way that it interrupts the electrical contact between the electric circuit
10 and the firing pin (47) in the case of an opened breech (7).

2. The handgun according to Claim 1, in which the contact lever (45) is pivoted on a
swiveling axis (55) on whose exterior in the region of this swiveling axis (55) an
electrically conductive point of contact (59) is provided which cooperates with a sliding
15 contact (61) in such a way that the point of contact (59) is only in electrical connection
with the sliding contact (61) when the contact lever (45) is in its swiveling position in
which case the breech (7) is closed.

3. The handgun according to Claim 1 or 2, in which the firing pin (47) is electrically
20 insulated with regard to the breech (7).

4. The handgun according to Claim 3, in which the circuit runs between a loaded cartridge
and the electric circuit on the one hand via the firing pin (47) and the contact lever (45) and
on the other hand via the breech (7), and the contact lever (45) cooperates with the breech
25 (7) in such a way that in the case of an opening breech (7) the circuit is short-circuited via
the contact lever (45).

5. The handgun according to Claim 4, in which the electrical contact between contact lever (45) and firing pin (47) is interrupted by opening the breech (7).

6. The handgun according to any one of Claims 1 to 5, in which the firing pin (47) is axially movable opposite the breech (7) between two positions, wherein its ignition tip in the first position protrudes from the breech block (13) of the breech (7) and in the second position does not protrude from the breech block, wherein a firing pin spring (51) pre-stresses the firing pin (47) into the first position.

7. The handgun according to Claim 6, in which the contact lever (45) lies in the case of a closed breech (7) on the rear end of the firing pin (47) and is pre-stressed against this end with a contact lever spring (53) whose elastic force is greater than that of the firing pin spring (51).

8. The handgun according to any one of Claims 1 to 7, which exhibits a trigger detection device (37) coupled with the trigger (35) which activates the electric circuit in the case of a pulled trigger (35).

9. The handgun according to any one of Claims 1 to 8, which exhibits a release detection device (39) coupled with the trigger (35) which activates the electric circuit in the case of a released trigger (35).

10. The handgun according to Claim 8 or 9 which exhibits a rod connected to the trigger (35), said rod leading to the rear and which exhibits an actuating means (33) which activates the trigger detection device (37) and the release detection device (39).

11. The handgun according to any one of Claims 1 to 10, in which the electric circuit exhibits an identification device for identification of the marksman holding the weapon, said device activating the electric circuit after identification of the marksman.

12. The handgun according to any one of Claims 1 to 11, in which the electric circuit exhibits a manually operable safety switch (29) which upon actuation activates the electric circuit.

13. The handgun according to Claim 12, in which the safety switch (29) is constructed as a grip safety pushbutton-rest switch and is assigned to a grip safety (27).

14. The handgun according to Claim 13, in which the grip safety (27) actuating the grip safety pushbutton-rest switch (29) is housed in the rear side of the grip (3), where it can be actuated by the part of the hand encompassing the weapon grip of marksman which lies between the thumb and the index finger.

15. The handgun according to any one of Claims 8 to 11, in which the electric circuit is arranged in such a way that it applies an ignition voltage to the contact lever (45) when it has been activated by the identification device, the safety switch (29) and in chronological sequence first by the release detection device (39) and then by the trigger detection device (37).

16. The handgun according to any one of Claims 1 to 15, which exhibits a trigger spring arranged on the trigger (35) which guides the released trigger (35) back to the front position.

17. The handgun according to any one of Claims 1 to 16, which exhibits a thrust piece (43) which is arranged in the blade (41) of the trigger (35) directed to the rear and which in the

case of actuating of the trigger (35) over an initial distance rests against the grip (7) and then only permits a further actuating of the trigger (35) a short distance and under increased elastic force.

5 18. The handgun according to Claim 17, in which the distance of the trigger actuation to the beginning of the increased spring force is adjustable.

19. The handgun according to Claim 17 or 18, in which the spring force is adjustable.

10 20. The handgun according to any one of Claims 1 to 9, in which the electric circuit exhibits a battery (19) with an output voltage which is lower than the voltage required for triggering a shot, and a transformer circuit which transforms the output voltage of the battery (19) to the voltage required for triggering a shot.

15 21. The handgun according to any one of Claims 1 to 20, in which a battery room (17) is recessed in the bottom side of the magazine (15), said room which holds the battery (19).

22. The handgun according to Claim 21, in which the battery room (17) cannot be opened or can only be opened with a special tool.

20 23. The handgun according to Claim 21 or 22, in which at least one contact (21) connected to the battery (19) is provided on the rear side of the magazine room (17) with which a counter contact arranged in the magazine well cooperates.

25 24. The handgun according to any one of Claims 1 to 23, in which the electric circuit is seated in the rear side of the grip (3) preferably in a grip space (23).

25. The handgun according to any one of Claims 1 to 24, in which the firing pin (47) is designed having two parts, with one top part (63) turned to the cartridge bottom and one base part (65) turned to the contact lever (45), said parts being connected to one another via a spring means (67), wherein the weight of the top part (63) is less than that of the base part (65).

5

26. The handgun according to Claim 25 in which the weight of the top part (63) is less than that of the base part (65) by at least the factor 5, in particular for instance by the factor 8.

10

27. The handgun according to any one of Claims 1 to 26, in which the firing pin (47) is fixed in axial direction with regard to the breech (7).

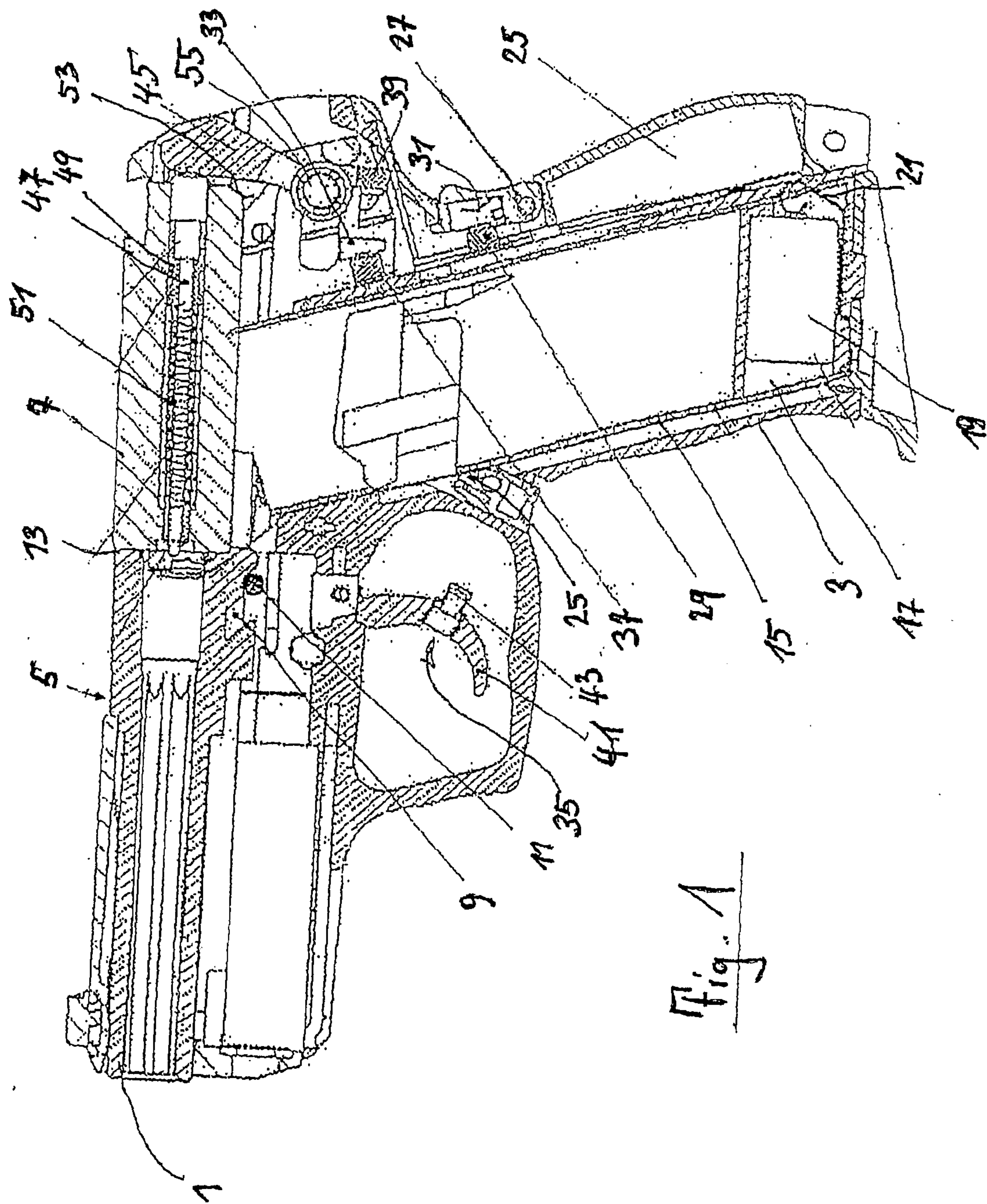
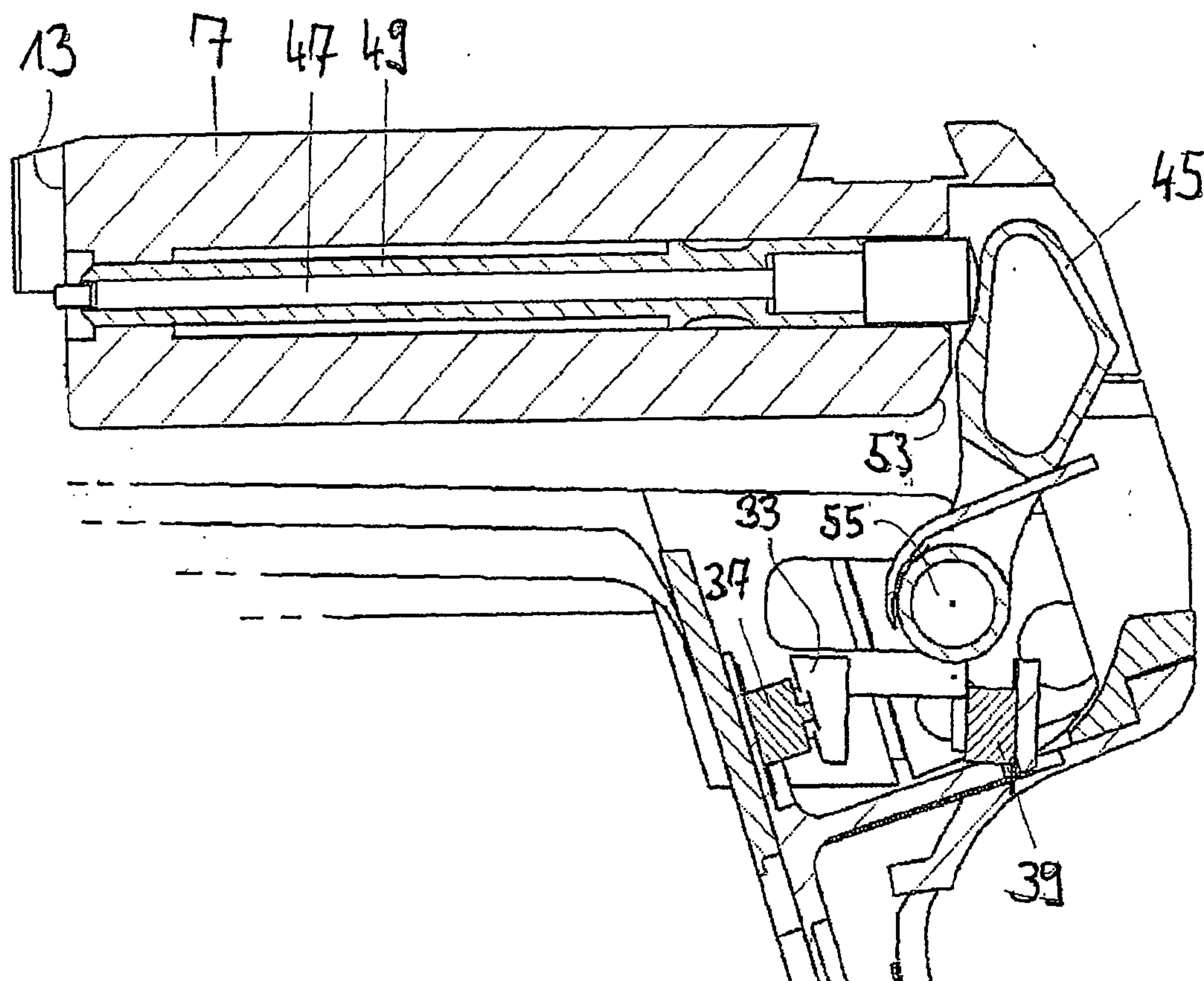


Fig. 2

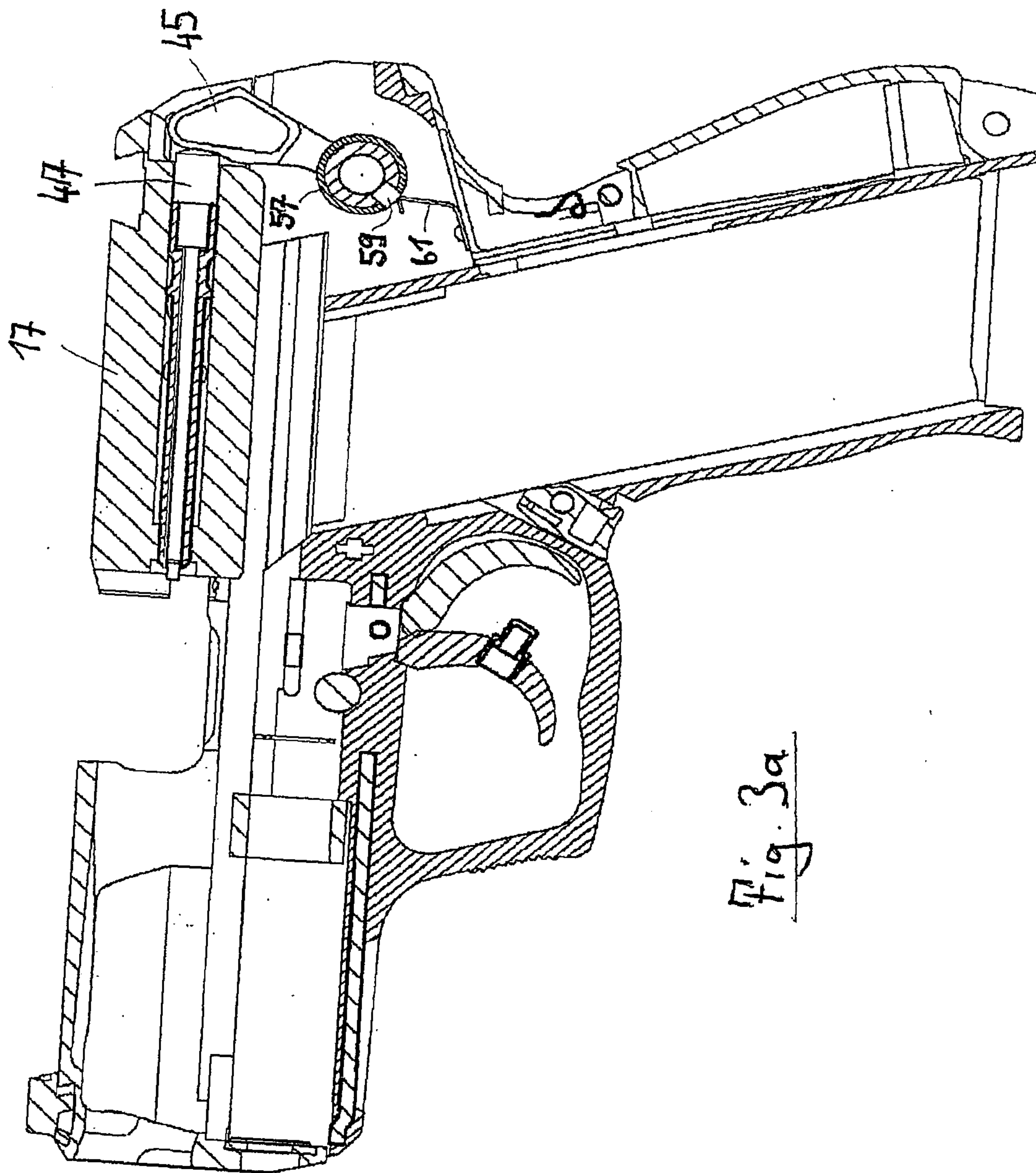


Fig. 3a

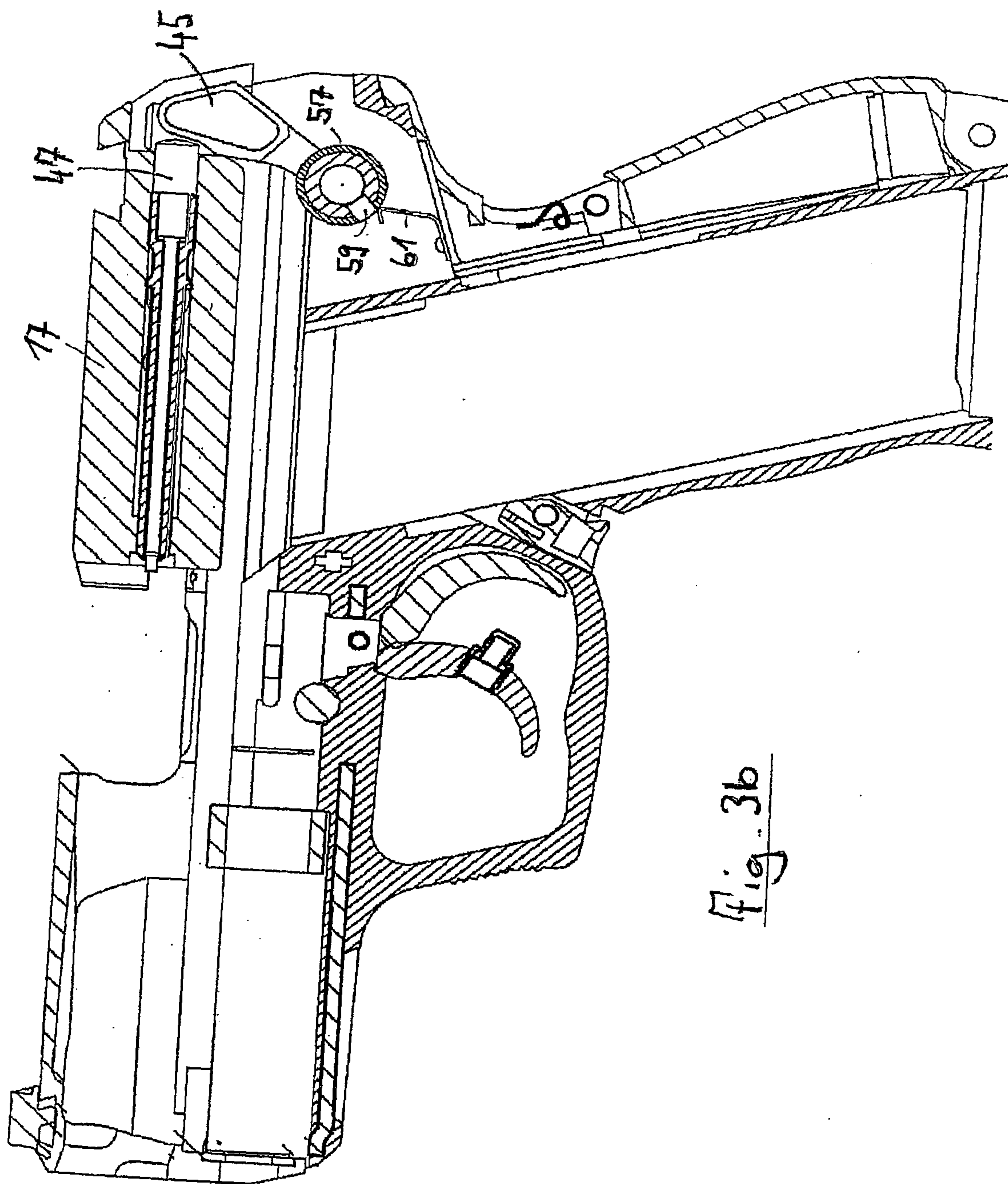


Fig. 3b

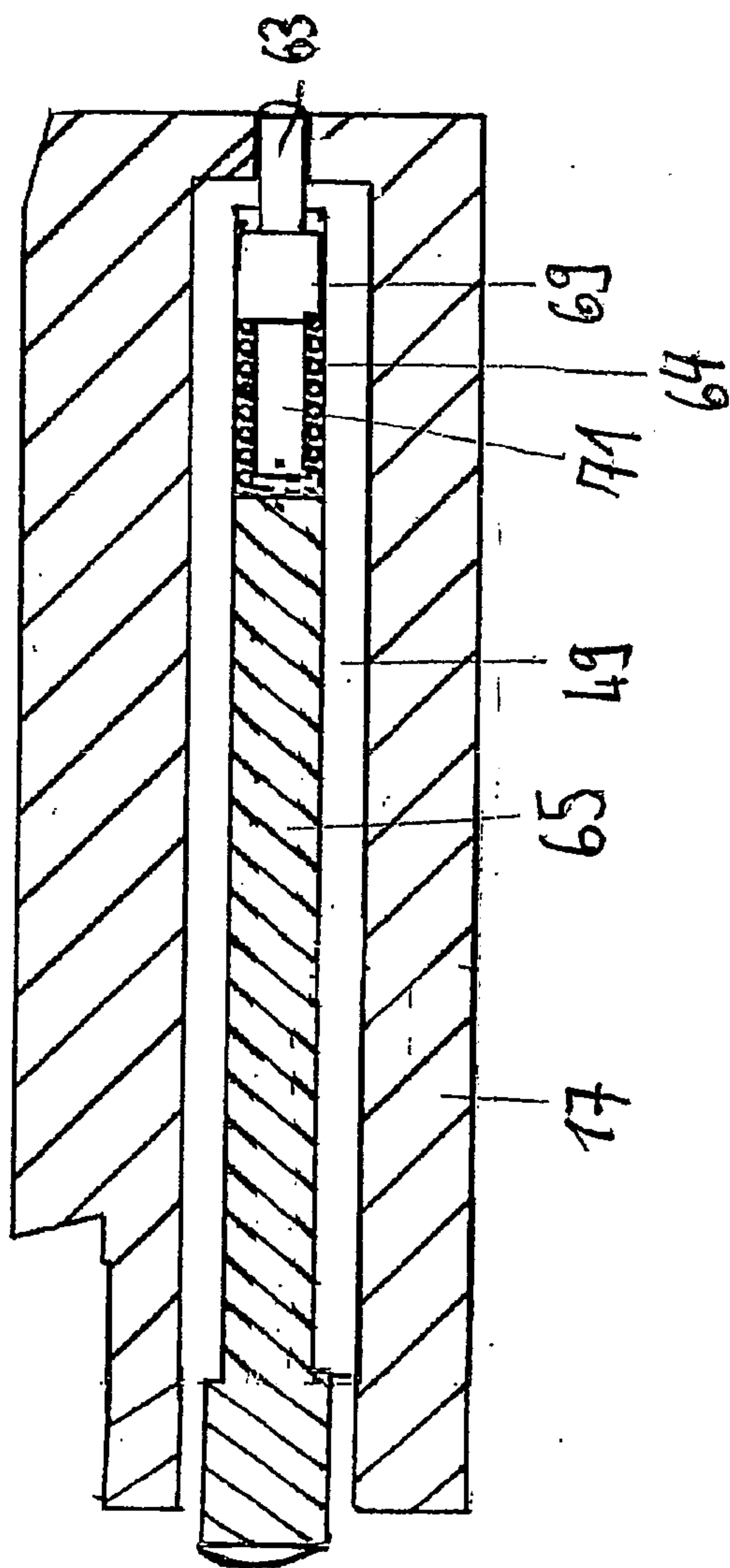


Fig. 4

