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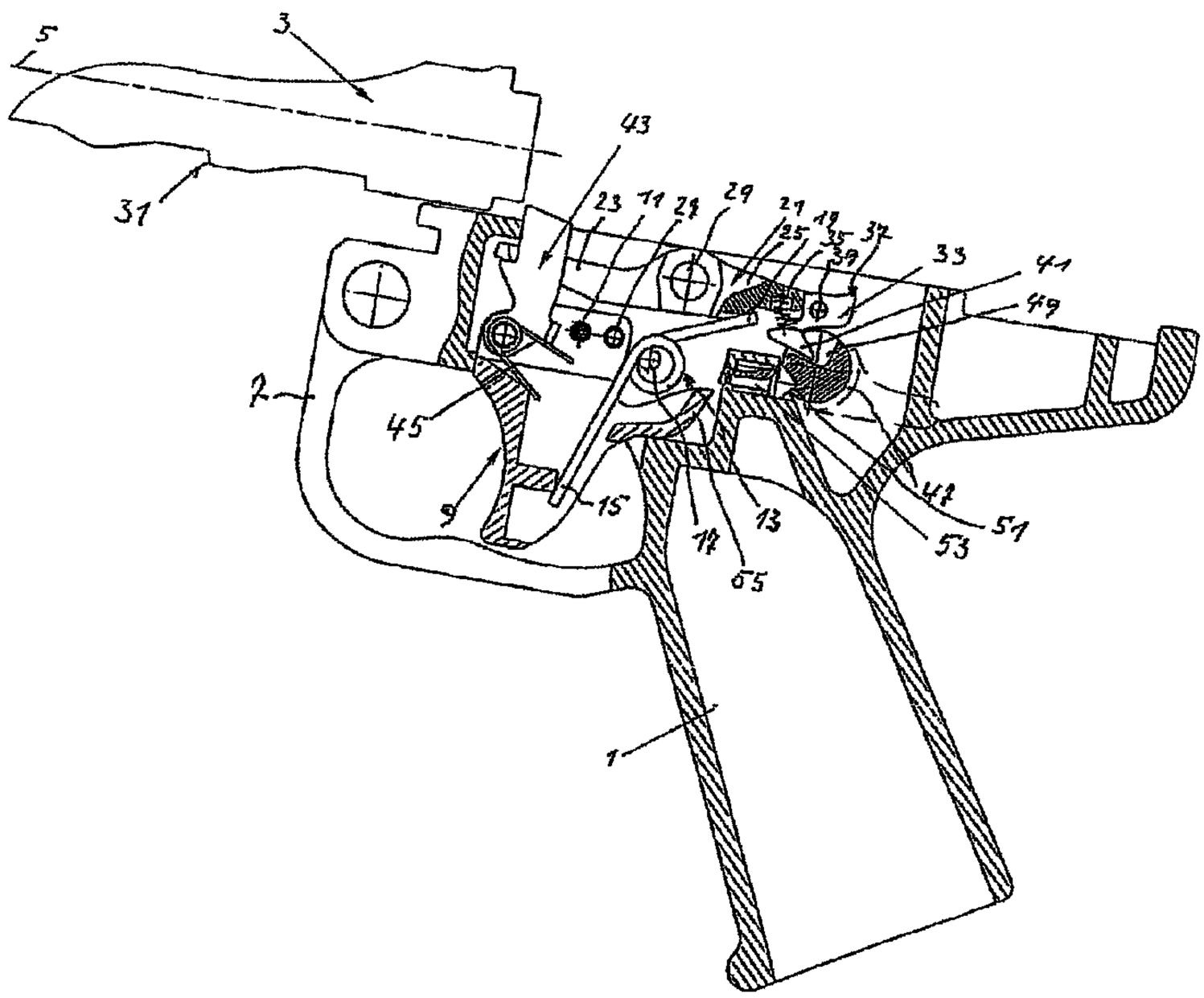
(72) Inventeur/Inventor:
GABLOWSKI, JURGEN, DE

(73) Propriétaire/Owner:
HECKLER & KOCH GMBH, DE

(74) Agent: RIDOUT & MAYBEE LLP

(54) Titre : DISPOSITIF DE DETENTE DESTINE A UNE ARME DE POING AUTOMATIQUE
(54) Title: TRIGGER DEVICE FOR A RAPID-FIRING PORTABLE FIREARM



(57) Abrégé/Abstract:
The invention relates to a trigger device for a rapid-firing portable firearm with a trigger that can be pivoted against the force of a spring from a resting position to a trigger position which acts on a swiveling breech catch, which has a sear arm acting on the path of motion of the breech, with a safety catch mechanism that preferably locks the trigger in its resting position. In accordance with the invention: the sear arm is constructed on a safety catch, which is swivel-mounted to the breech catch from a locking position against the force of a spring in an operable position, in which position it does not act on the path of motion of the breech; the safety catch acting on the path of motion of the breech can be forced by the breech into its locking position, and the safety catch mechanism is set up to also lock the breech catch.

Abstract

The invention relates to a trigger device for a rapid-firing portable firearm with a trigger that can be pivoted against the force of a spring from a resting position to a trigger position which acts on a swiveling breech catch, which has a sear arm acting on the path of motion of the breech, with a safety catch mechanism that preferably locks the trigger in its resting position. In accordance with the invention:

the sear arm is constructed on a safety catch, which is swivel-mounted to the breech catch from a locking position against the force of a spring in an operable position, in which position it does not act on the path of motion of the breech;

the safety catch acting on the path of motion of the breech can be forced by the breech into its locking position, and

the safety catch mechanism is set up to also lock the breech catch.

Trigger device for a rapid-firing portable firearm

The invention relates to a trigger device for a rapid-firing portable firearm with a trigger that can be pivoted against the force of a spring from a resting position to a trigger position which acts on a swiveling breech catch.

When position references such as "above", "in front" or the like are mentioned in these documents, the weapon is assumed to be in normal firing position, firing horizontally "forward".

US 4,133,128, DE-OS 1 428 772 and EP 0 204 691 A2 were known.

Rapid-firing weapons, such as sub-machine guns or machine guns, which are only set up for emission of sustained fire have a rather simple trigger mechanism, of which a representative example is described in the following:

Beneath the path of motion of the breech there is a butt, in which a trigger is swivel-mounted. The swivel axis, which proceeds laterally, is located over the trigger, so that upon operation of the trigger the rear upper part travels a curved path upward. This rear upper part of the trigger acts on the front end of a breech catch, which for its part, can be pivoted around a lateral axis, is mounted in the weapon casing or in the butt. The rear end of the breech catch is constructed as a sear arm. When the trigger is pressed by a trigger spring in its resting position, then the front end of the breech catch moves downward, and the sear arm moves upward. This position of the sear arm is the locking position.

The breech catch is usually cushioned by a separate spring, which forces it into a locking position . If the breech is now pulled back to its previous resting position, then it moves the sear arm and thus the rear end of the breech catch down, while it passes at least partially over the sear arm. When a sear catch, which is constructed on the bottom of the breech, has passed over the sear arm, then the sear arm snaps upward and the moves the sear catch back. The weapon is now cocked and ready to fire.

When the trigger is operated, then the sear arm sinks until it releases the sear catch and the weapon begins sustained fire. When the trigger is released, then the sear arm moves back up, moves the sear catch back and holds the breech in its fire readiness position (rear position). As a result the sustained fire ceases.

Usually only a safety catch is used as a safety mechanism, which, while ruling out the unintentional operation of the trigger, it does not rule out a giving way of the sear arm for example due to forces of gravity, for example if the loaded, cocked and trigger-secured machine gun falls off a truck.

While one could also lock the breech catch for security, this has the disadvantage that the breech gets jammed over the breech catch when it is pulled back with a locked weapon, because it cannot give way.

Now, it is proper to put the weapon on safety when an extraordinary situation occurs. An empty magazine or the end of the ammunition belt can be an extraordinary situation for inexperienced shooters if the breech is located in front. However, particularly in the case of jammed loading mechanisms, the attention of the shooter is completely occupied, so that a mistaken operation of operating devices can easily happen. Precisely in the case of a jammed loading mechanism, the breech should, as the first measure, be pulled back so far that the sear arm falls into the sear catch, so that the caught breech does not come loose, run to the front and inadvertently trigger a shot.

At least in training and at the shooting range it is also desirable that the breech be pulled back when the safety is on and the firearm not be ready to fire until right before the shot is fired. However, up to now this has only been possible with safety catches.

Proceeding from this problem the invention is based on the object of further developing a firearm of the above-mentioned type with simple resources in such a way that is possible put the safety on without the forces of gravity being able to bring the breech catch out of engagement with the breech. However, it should always be possible to pull back the breech.

The breech catch should also be immovable upon the action of forces of gravity, but be able to give way to the pulled back breech, and do so with simple resources.

To solve this task the initially named firearm is designed in the following manner:

Trigger device for a rapid-firing portable firearm with a trigger (9) that can be pivoted against the force of a spring (13) from a resting position to a trigger position which acts on a swiveling breech catch (21), which has a sear arm (37) acting on the path of motion of the breech (3), with a safety catch mechanism (47-55) that preferably locks the trigger (9) in its resting position, whereby

- the sear arm (37) is constructed on a safety catch (33), which is swivel-mounted to the breech catch (21) from a locking position against the force of a spring (35) in an inoperable position, in which position it does not act on the path of motion of the breech (3),
- the safety catch (33) acting on the path of motion of the breech (3) can be forced by the breech (3) into its locking position and
- the safety catch mechanism (47-55) is set up to also lock the breech catch (21),

and whereby

- a spring-mounted trip-releasing catch (43) is attached to the trigger (9), which in its resting position does not put the breech catch (21) into its operative position until the breech (3) ascends (Claim 1).

The catch has a slight mass, and the forces of gravity, which can become operative in a fall are therefore lower than the elastic force of the spring , which loads the catch. In addition the breech keeps the catch in the locking position, whereby the breech-closing spring, which acts on the breech, causes the stop.

In this simplest development of the invention the trigger exclusively acts on the breech catch. If the trigger is released only a little while the machine gun is firing, then in its forward motion the breech strikes the edge of the sear arm after its recoil and can as a result force the safety catch out of the path of motion of the breech. The precise firing of a single shot or short burst of fire is not possible, because one always has to take into account the possibility that one or two unintended shots will follow.

This problem can be alleviated by means of appropriate training by teaching the soldiers to release the trigger very quickly. However this is not a solution.
The invention, on the other hand, proposes

- that the safety catch mechanism has a movable edge in the path of motion of the safety catch and
- that the safety catch and its spring be constructed in such a way that upon release of the breech catch the safety catch gives way to the edge, and in operative position of the breech catch the edge then locks the breech catch and the safety catch (Claim 2).

The trip-releasing catch keeps the breech catch (with released trigger) in an inoperative position until the breech comes back and operates the trip-releasing catch, which then for its part releases the breech catch. The breech catch now snaps into its operative position. Since the spring of the breech catch is stronger than the spring of the safety catch, the safety catch gives way to the breech, until it can fall into the sear catch. The safety catch is namely swivel-mounted, whereby the mounting takes place at a lateral axis, which the safety catch penetrates between the sear arm and the other end. This lateral axis is mounted in the breech catch. When the search catch gives way in a counter-clockwise motion, the other end of the safety catch also gives way in a counter-clockwise motion. In the process, the named other end of the safety catch emerges under the named edge of the safety catch mechanism. Since the breech catch continues to swing, the safety catch is lifted further and swings back above the named edge again when the sear arm falls into the sear catch

The breech now forces the safety catch firmly against the breech catch, since the direction of the force acting upon the sear arm runs above the swivel axis of the breech catch and above the swivel axis of the safety catch and thus both elements are turned in the same direction toward the breech

When a force of gravity acts on the breech catch and endeavors to move it toward the elastic force, then the safety catch moves along with it and strikes the named edge with its bottom side (on the same side of the lateral axis as the sear arm). Tne breech catch is thus locked not directly, but rather indirectly.

A backward motion of the breech is on the other hand possible, since then the safety catch simply swings out. In the process, the edge is arranged in such a way that the swinging out of the safety catch is just barely possible. The arrangement and development of breech catch, safety catch and movable edge, with regard to the butt, must therefore occur rather precisely. Since rather few tolerances add up, however, this is easily possible, without any hand finishing being necessary.

The safety catch mechanism could basically be any conventional type of safety catch, e.g. a sliding safety catch or a push-button safety catch. However, it is particularly advantageous that the safety catch mechanism have a lateral running, rotating safety roller at which a recess is constructed, whose side wall together with the circumference of the safety roller forms the named edge (Claim 3). Such a safety roller has the advantage of laterally penetrating the butt, so that on each of the ends and outside of the butt an operating handle or safety lever can be attached. This right or left safety lever has in each case the same allocation to the trigger and can thus be used in the same manner both for right-handers and left-handers.

Advantageously the trigger device can also be further developed by

- providing the safety roller with a stop recess,
- providing a safety bolt, which, in firing position of the safety roller falls into the stop recess

and

- that the safety bolt engages in the path of the trigger and locks it when the safety roller is located in the locking position and the safety bolt is not engaging in the stop recess (Claim 4).

The optional, additional feature of a trigger device is adopted here and integrated in the safety catch mechanism. This integration is not only possible with a safety roller, but rather also with a different type of safety catch. In the locking of a machine gun it is in any case required that the safety catch be locked by a powerful stop if the weapon is exposed to severe vibrations during sustained fire. It is necessary to prevent the weapon from inadvertently locking during the firing.

The stop bolt is therefore further developed in accordance with the invention as a safety bolt. The powerful stop is consequently further developed as a safety catch which automatically engages when and for as long as the safety roller is moved to the safety position. For this purpose the trigger is slightly modified. A construction is provided on the trigger which, when the trigger is operated, enters in the path of motion of

the safety bolt (Claim 5). Since the trigger is usually manufactured as a die cast part or a precision cast part anyway, this construction can be manufactured without any additional costs.

A stop recess in the safety roller is also provided for the safety position, into which the safety bolt falls as a stop bolt when the weapon is on safety, as is common practice. Firing positions are also provided, which restrict the rotational motion of the safety roller in every direction. These firing positions can also be constructed on the exterior of the butt and can interact with the operating levers of the safety roller.

The object of the invention will be explained in greater detail in the attached drawings. These drawings show by means of diagrams a non-restrictive exemplified embodiment. The drawings show the following:

Figure 1 shows a partially cut butt of a machine gun and the rear, bottom part of the breech in the front position; the visible trigger mechanism is cocked, and

Figures 2 through 5 show a representation as in Figure 1, however, in a locked state, whereby the breech is moved further to the rear from figure to figure.

Only in Figure 1 are all the drawing references entered; for reasons of better clarity certain references have been omitted in Figures 2 through 5. However, all the figures show the same object; the drawing references are valid for all of the figures.

A butt 1 is shown in the figures, across which a breech 3 can be moved horizontally along a center shaft 5. The butt is attached to a casing in which a path of motion is defined for the breech 3. For simplicity's sake, the casing is not shown.

The butt 1 has a trigger guard on the front, into which a trigger 9 enters from above. The main part of this trigger 9 is an acute triangle with the apex pointed to the bottom, which near the middle of its base is penetrated by a lateral running trigger shaft 11. A trigger spring 13 in the form of a two-legged, spiral-shaped wire spring has two legs, of which the bottom spring leg 15 forces the trigger 9 forward. The central spiral section of the trigger spring 13 loosely surrounds a cross pin 17. The upper spring leg 19 of the trigger spring supports itself on a breech catch 21.

This breech catch 21 is approximately rectilinear in design and has two lever arms with a front lever arm 23 and a rear lever arm 25. The upper spring leg 19 of the trigger spring 13 supports itself from the bottom on the rear lever arm 25. Under the center of the front lever arm 23 sits a release roller 27. This release roller 27 can be pivoted around a lateral axis which is seated in the trigger 9, to be precise, near the rear part of

the base of the trigger 9. Between the front 23 and rear lever arm 25 the breech catch 21 is swivel-mounted to a lateral lever axle 29.

The upper spring leg 19 loads the breech catch 21 in such a way that it is turned counter-clockwise. The lower spring leg 15 loads the trigger 9 in such a way that it is turned clockwise. The swivel directions refer to the representations of the drawings in which the direction of view occurs from the left.

If the trigger 9 is operated, that is, turned against the force of the trigger spring 13 counter-clockwise, the release roller 27 lifts the front lever arm 23 against the force of the trigger spring 13 and the end of the rear lever arm 25 is lowered.

At the rear end of the rear lever arm 25 a safety catch 33 is attached which pivots around a crossbolt 39. Behind the cross bolt, a sear arm 37 is constructed on the upper side of the safety catch 33. In front of the crossbolt 39 a nose 41 extended forward and downward is constructed. Between the bottom side of the rear lever arm 25 and the top side of the nose 41 sits a compression spring 35. The compression spring 35 forces the safety catch 33 upward.

When the breech catch 21 is in the resting position, then the sear arm 37 engages in the path of motion of the breech 3. If the breech is guided to the rear end of its path of motion, then a (not shown in the figures) breech-closing spring after that attempts to move the breech 3 back forward to the position that is shown in Figure 1. In the process the breech 3 with a sear catch 31 constructed on its bottom side engages the sear arm 37 and thrusts it forward. In the process the direction of force of the breech 3 above the crossbolt 39 proceeds forward and therefore forces the safety catch 33 against the breech catch 21 to an end position. The force of the compression spring 35 is supported hereby (Figure 5).

The front lever arm 23 is bent on its front end and is held in a specified operating position, which is shown in Figure 1, by a trip-releasing catch 43 positioned underneath. This trip-releasing catch 43 is pivoted around a pin against the force of a catch spring 45. The catch spring 45 moves the trip-releasing catch 43 counterclockwise. The pin is near the front part of the base of the trigger, attached within.

The operating position shown in Figure 1 extends the free end of the trip-releasing catch 43 into the path of motion of the breech 3. In the process the breech catch 21 is kept in inoperative position when the trigger 9 is released and the breech 3 is not currently in its rear position. Not until the breech 3 proceeds to the rear does it run up to the trip-releasing catch 43 and turn it in clockwise direction. In the process the trip-releasing catch 43 turns in clockwise direction and releases the breech catch 21. This breech catch 21 turns counterclockwise as a result, so that the sear arm 37 can engage the sear catch 31 of the breech 3 and hold it

in the last position. Thus the trip-releasing catch 43 makes a controlled firing of shots possible, as though it were absent.

The trip-releasing catch 43 is however, also a reason why it is not possible to simply lock the breech catch 21 in safety-on state by means of a simple so-called "trigger pin safety". For example, Figure 1 shows the state that the machine gun takes on when the shooter has emptied the ammunition belt with the trigger pulled and then releases the trigger. If only the breech catch 21 were locked, then one could pull back the breech 3 in safety on state, but the sear arm 37 could not fall into the sear catch 31 of the breech 3. The breech 3 would simply run forward again.

If the trip-releasing catch 43 were not present, then in the position of breech 3 and trigger 9 of Figure 1 the front lever arm 23 would rest on the release roller 27 of the trigger 9. If the breech catch 21 were then locked by means of a trigger pin safety, then the breech 3 could be pulled back, because the safety catch 33 would give way to the force of the compression spring 35 and let the breech pass to the rear. The trigger 9 would still be movable. The shooter thus could also not determine whether the safety was on or not by lightly activating the trigger (the so-called "taking up the slack of the trigger").

In the following we show how the invention even with a trigger device with a trip-releasing catch 43 locks both the breech catch 21 as well as the trigger in safety-on state.

In the rear, upper part the butt 1 is penetrated by a lateral pivoting safety roller 47. On one end or both ends of this safety roller 47 on the exterior of the butt 1 sits a safety-operation lever indicated only in dotted lines, which is easy to reach by the thumb of the hand activating the trigger.

The safety roller 47 has two defined positions, the firing position and the safety position. The firing position is shown in Figure 1. The safety position is shown in Figures 2 through 5.

The safety roller 47 has two recesses at its outer periphery, a safety catch recess 49 and a safety bolt recess 51. Further a horizontal safety bolt 53 is attached in the butt 1 between trigger 9 and safety roller 47, said horizontal safety bolt can be moved horizontally against the force of a safety spring (not shown) to the rear. The safety bolt 53 is constructed on its end turned toward the safety roller 47 as a stop head in the shape of a truncated cone, which in firing position of the safety roller 47 falls into the safety bolt recess 51 (Figure 1) and reliably keeps the safety roller 47 in the firing position. In the safety position (Figures 2-5) the apex of the stop head falls into a small depression of the outer surface of the safety roller 47. This depression cannot be made out in the drawing, but is located between the two recesses 49 and 51.

The safety spring is located in a pocket bore of the butt. The bottom of this pocket bore is formed by a wall in the inside of the butt 1. The trigger 9 for its part has a spur-shaped extension 55, which extends from the middle of its rear triangle corner to the rear and above. When the trigger 9 is operated then the free end of this extension 55 moves past the named wall.

The safety bolt 53 penetrates the named pocket bore and pierces through its floor, that is, the afore-mentioned wall. In the firing position, in which the safety bolt 53 falls into the deep safety bolt recess 51 of the safety roller, the front end of the safety bolt terminates about at the surface of the named wall turned to the trigger 9 (Figure 1). The trigger 9 can thus be pulled without hindrance.

If the safety roller 47 is tilted to the safety position (Figures 2-5), then the safety bolt 53 is forced out of the safety bolt recess 51 (forward). Its front end engages in the swivel path of the extension 55 of the trigger 9. The trigger can therefore no longer be operated, at any rate, not until the trigger slack.

If the trigger device is in the position of Figure 1, then the breech catch 21 is swiveled by means of the trip-releasing catch 43 into an end position, in which the nose 41 of the safety catch 33 runs into the one side wall of the wedge-shaped safety catch recess 49. By turning the safety roller 47 into the safety position, that is, counterclockwise (in the drawing), the safety catch recess 49 encompasses the nose 41.

If the breech 3 is now pulled back (Figure 3), then the trip-releasing catch 43 is turned clockwise and releases the breech catch 21. The breech catch 21 snaps counterclockwise under the effect of the powerful trigger spring 13 with the rear lever arm 25 in an upward direction. In the process the edge of the nose 41 strikes the other side wall of the safety catch recess 49 lying above. The nose 41 gives way, by turning the entire safety catch 33 clockwise against the relatively weak force of the compression spring 35, and runs over the edge of the safety catch recess 49 toward the top (Figure 4).

When the sear catch 31 is above the sear arm 37, then the sear arm 37 falls into the sear catch 31 and the nose 41 pivots over the safety roller 47 (Figure 5). If the weapon now for example falls off a truck to the ground and forces of gravity attempt to swivel the breech catch 21, then the lower area of the nose 41 collides with the periphery of the safety roller 47. As a result, the swivel movement of the safety catch 33 is prevented and said safety catch 33 is locked.

If the safety roller 47 is swiveled back into the firing position, then the trigger 9 and the safety catch 33 are again simultaneously released.

This is how a trigger device with optimum safety and the highest operating convenience is created.

Claims

1. Trigger device for a rapid-firing portable firearm with a trigger that can be pivoted against the force of a spring from a resting position to a trigger position which acts on a swiveling breech catch, which has a sear arm acting on the path of motion of the breech, with a safety catch mechanism that locks the trigger in its resting position, whereby:

the sear arm is constructed on a safety catch, which is swivel mounted to the breech catch from a locking position against the force of a spring in an inoperable position, in which position it does not act on the path of motion of the breech;

the safety catch acting on the path of motion of the breech can be forced by the breech into its locking position; and

the safety catch mechanism is set up to also lock the breech catch, and whereby

a spring-mounted trip-releasing catch is attached to the trigger, which in its resting position does not put the breech catch into its operative position until the breech ascends.

2. Trigger device according to Claim 1, characterized by the fact that the safety catch mechanism has a movable edge in the path of motion of the safety catch; and

that the safety catch and its spring be constructed in such a way that upon release of the breech catch the safety catch gives way to the edge, and in operative position of the breech catch the edge then locks the breech catch and the safety catch.

3. Trigger device according to Claim 2, characterized by the fact that the safety catch mechanism has a lateral running, rotating safety roller at which a recess is constructed, whose side wall together with the circumference of the safety roller forms the named edge.

4. Trigger device according to Claim 3, characterized by the fact:

that the safety roller is provided with a stop recess;

that a safety bolt is provided, which, in firing position of the safety roller falls into the stop recess; and

that the safety bolt engages in the path of the trigger and locks it when the safety roller is located in the locking position and the safety bolt is not engaging in the stop recess.

5. Trigger device according to Claim 4, characterized by the fact that a construction is provided on the trigger which, when the trigger is operated, enters in the path of motion of the safety bolt.

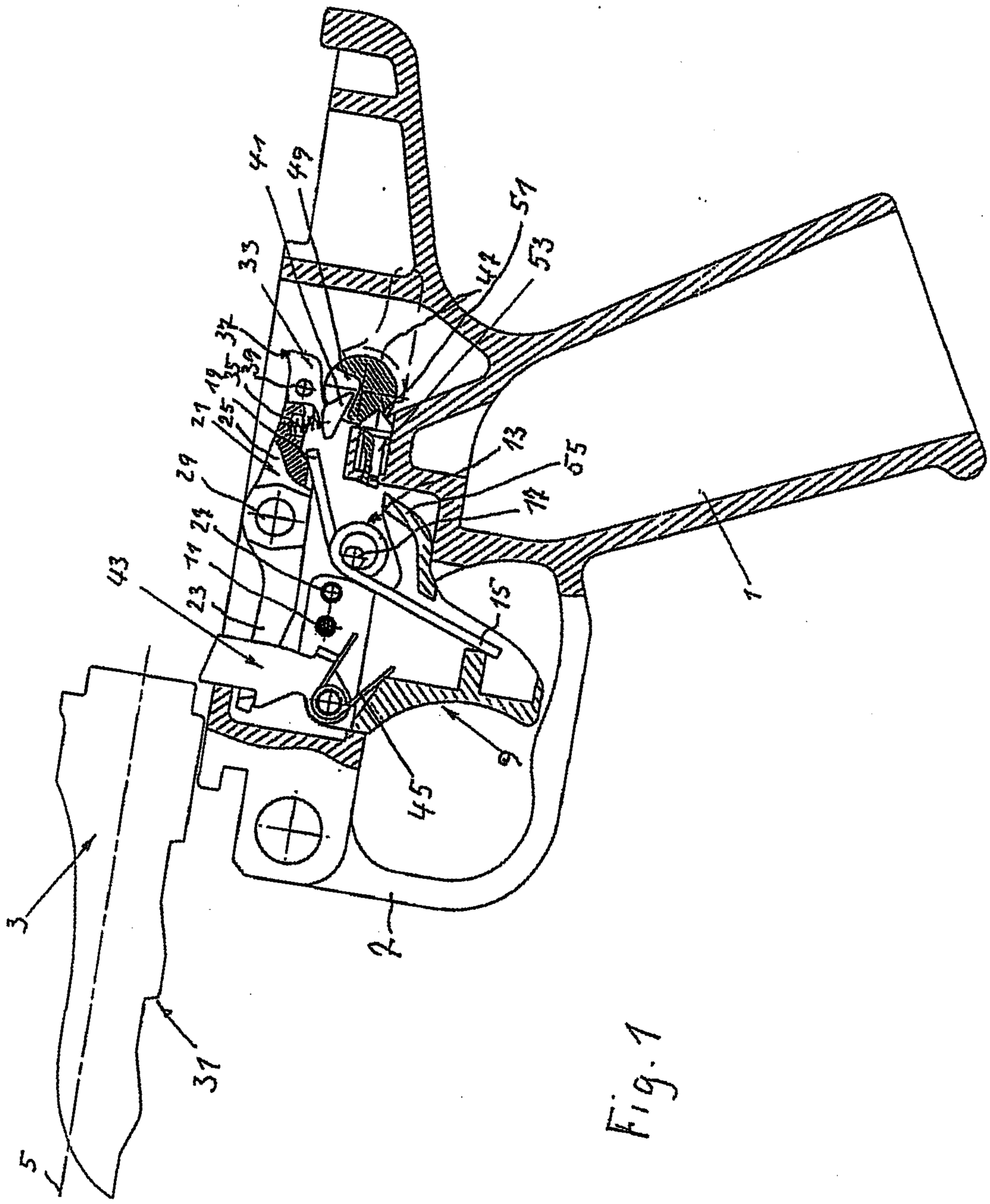

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Fig. 1

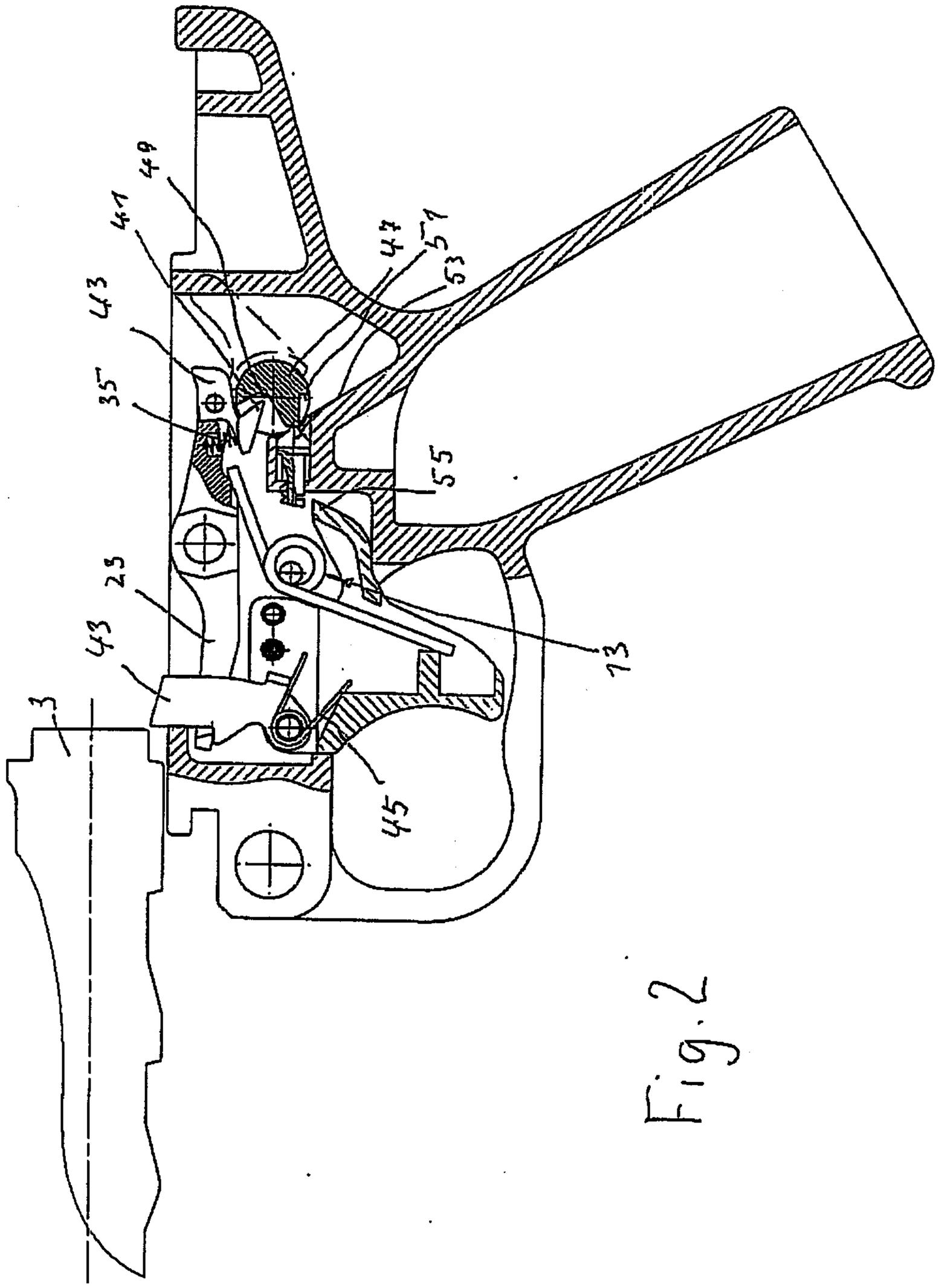

Fig. 2

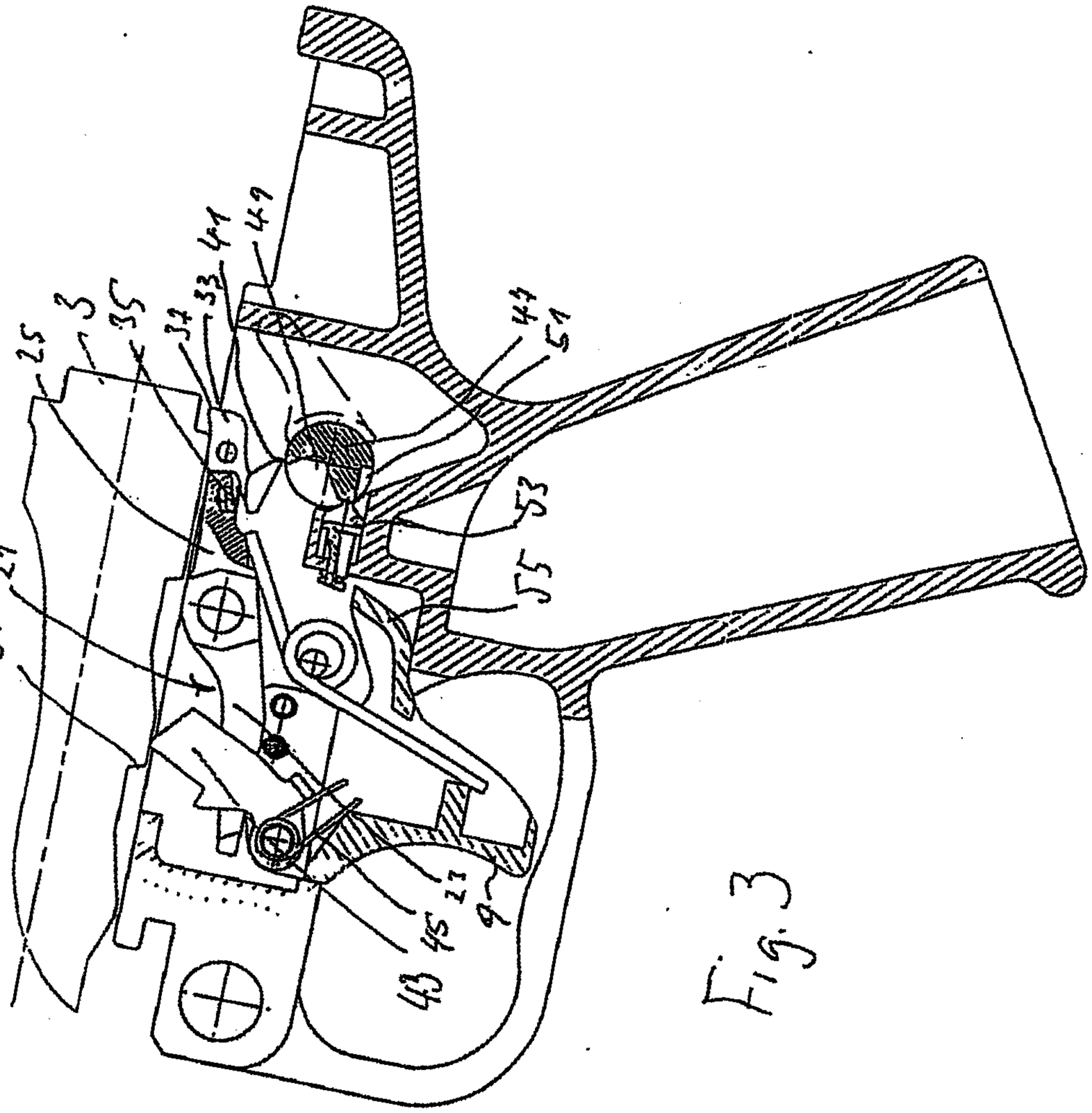

Fig. 3

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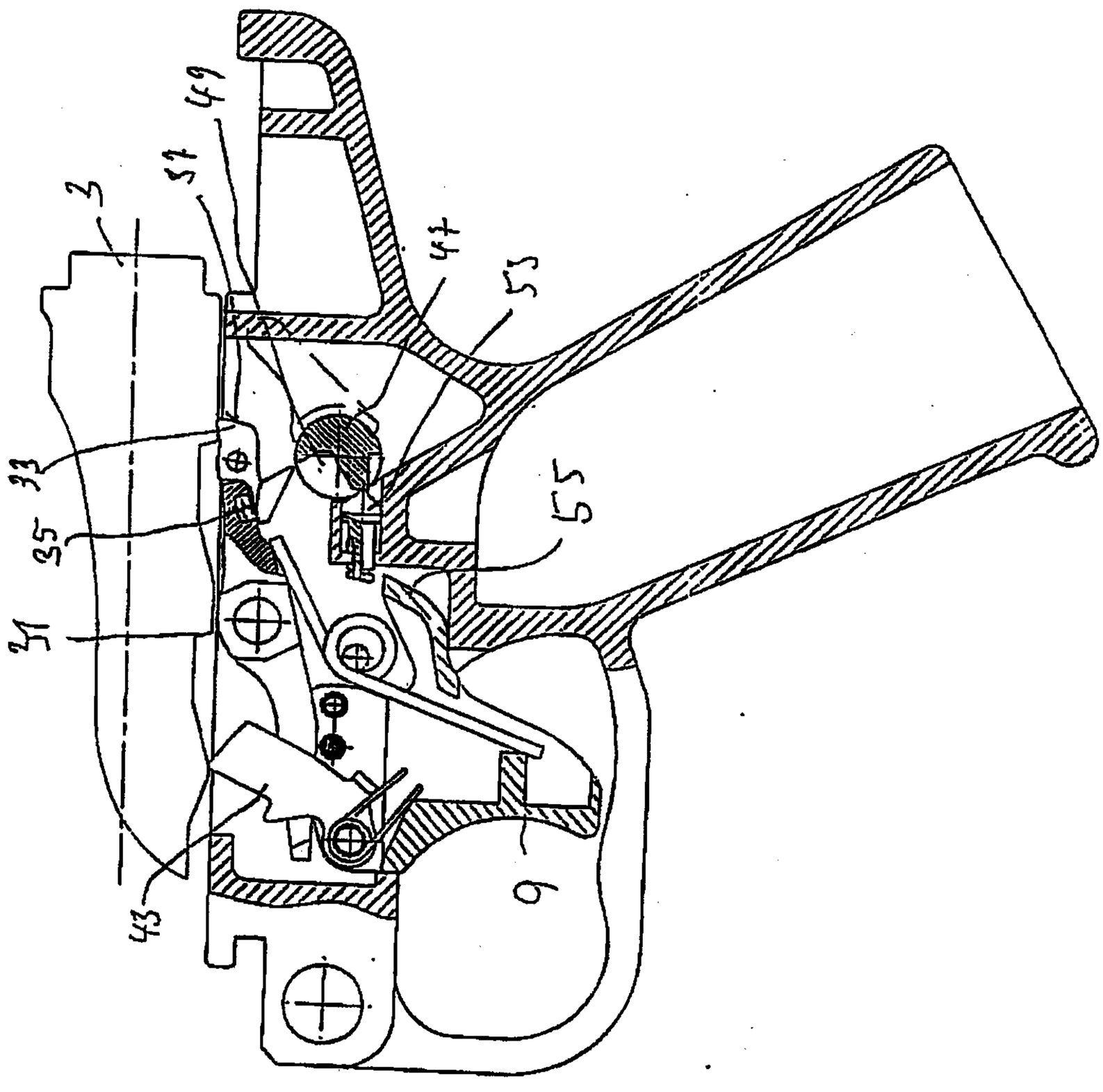
Fig. 4



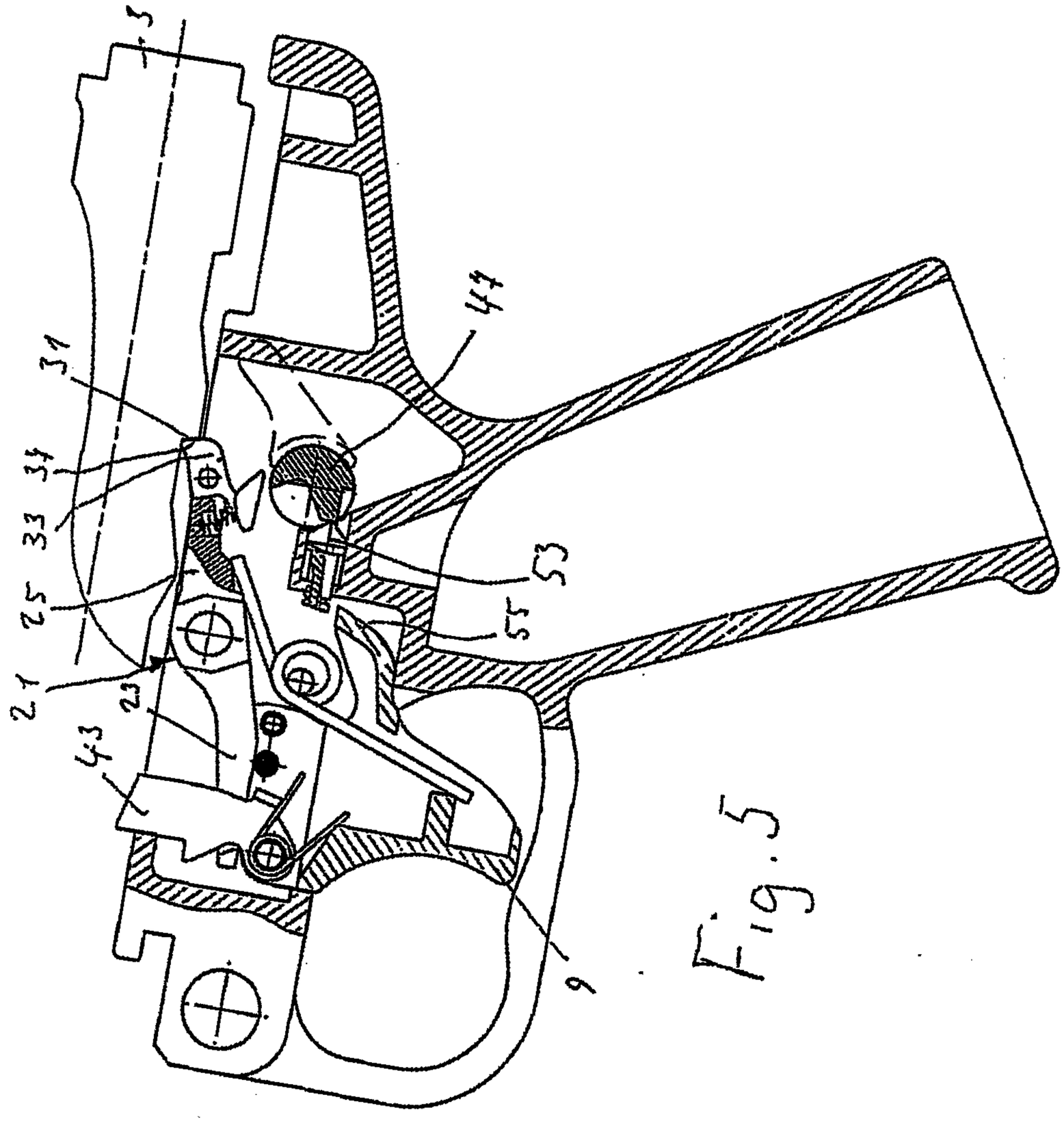
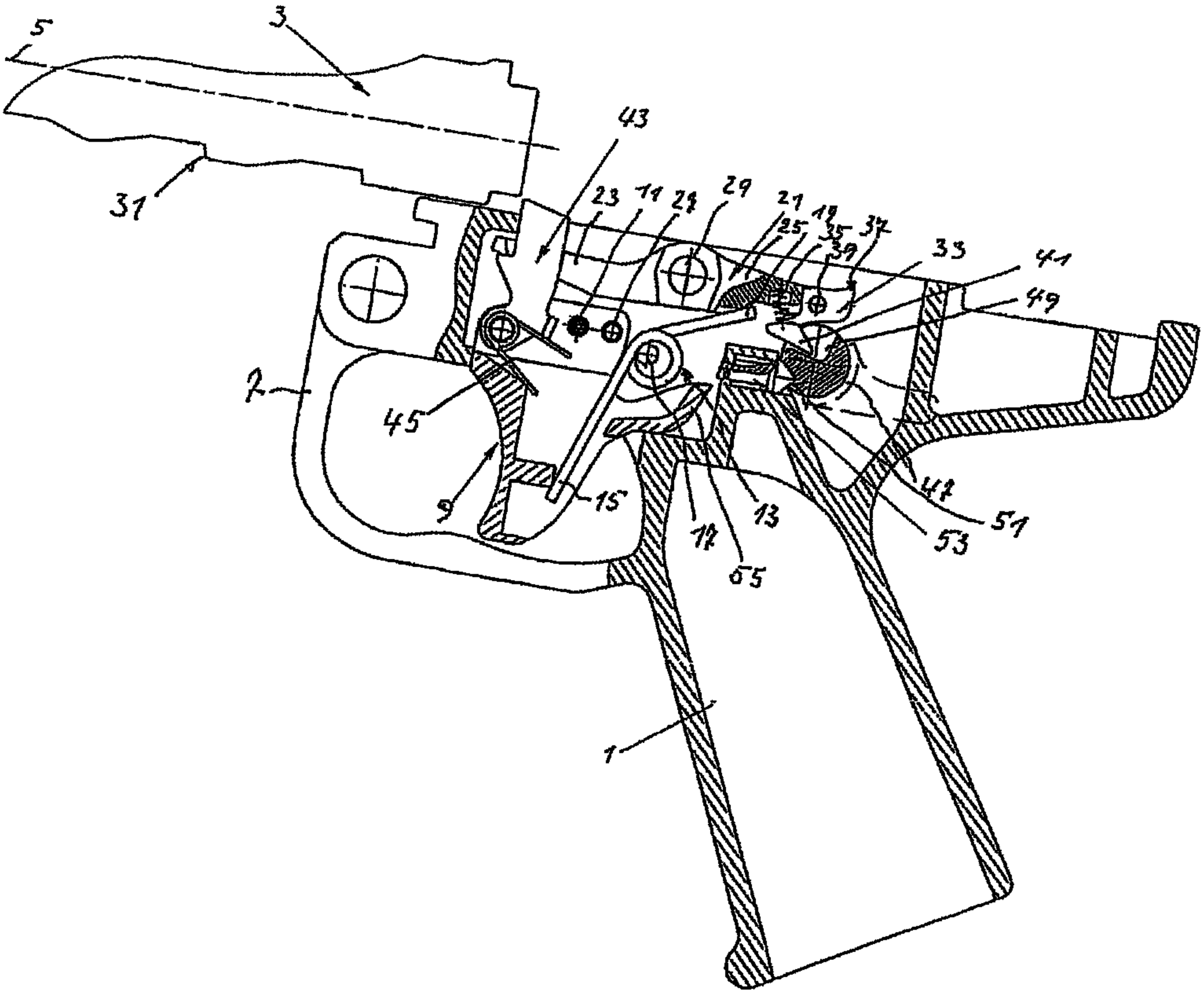


Fig. 5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