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(54) Release and percussion device, in particular for sports arms

(57) A release and percussion device, particularly for sports arms, of the type comprising a percussion pin (2) operated by respective actuation means (3), a first catch (5) for holding the percussion pin (2) in a cocked position, and a trigger (6) co-operating with the first catch (5) to release the percussion pin (2) from the cocked position, is distinguished in that the percussion pin (2) and the trigger (6) can be cocked independently of each other, so that the arm can be snapped without operating the percussion pin (2).

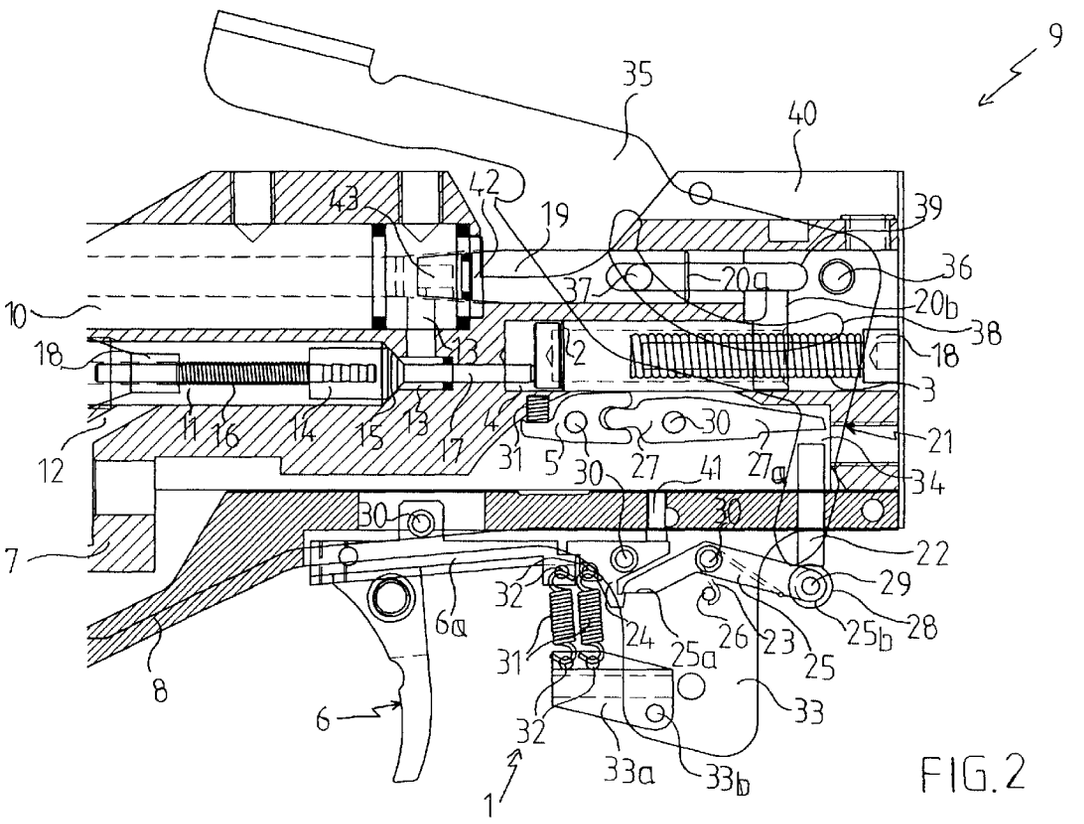

FIG. 2

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Description

Field of the Invention

This invention relates to a release and percussion device, in particular for sports arms, of the type comprising:

- a percussion pin operated by respective actuation means;
- a first catch for holding said percussion pin in a cocked position; and
- a trigger co-operating with said first catch to release the percussion pin from said cocked position.

In the description given below and in the following claims, the term: "sports arm", is understood to mean a competition arm of a high precision type for general use in target shooting practice.

In the description given below and in the following claims, the term: "cocked position", is understood to mean a position in which one or more elements of the release and percussion device, e.g. the percussion pin, is held in a stressed state by an externally applied push or compressive force. The cocked position, which is usually preliminary to actual shooting, is the opposite from the uncocked position in which the elements(s) of the release and percussion device are in an inactive state, relieved from the stress of said external force.

As is known, in the field of arms, especially sports arms, there exists a growing demand for providing release and percussion devices which, on the one side, are reliable and accurate in operation, and on the other, are simple and inexpensive to make, durable, and require no constantly applied maintenance.

Prior Art

To satisfy the above demand, release and percussion devices have long been proposed in this field which comprise a spring-loaded percussion pin held in the cocked position by a catch suitably connected to a trigger by a linkage.

With the device in the cocked position, it is sufficient to press back the trigger with a predetermined force to actuate the linkage and the catch, and release the percussion pin which, under the spring bias, ultimately strikes an appropriate means of ejecting the projectile.

While being advantageous from several aspects, prior art release and percussion devices have a number of drawbacks, especially when used in sports arms, among which a fast rate of wear and the need for frequent maintenance are outstanding.

When using a sports arm, e.g. in contests or for training purposes, a marksman usually squeezes the trigger in a series of trial "snaps" or blank shots -- i.e. shots resulting in no projectile being actually ejected through the barrel -- in order to familiarize himself with the pressure to be exerted on the trigger, and adjust his pull, as well as with the trigger travel distance before the percussion pin strikes. It is in fact vital to shooting accuracy that the marksman be aware of the exact amount of the trigger displacement, as well as of the force to be applied for operating the release and percussion device and shoot.

It should be noted that the number of such snaps that a marksman is likely to effect through the working life of a arm may well exceeds the number of the actual shots.

Since in prior art release and percussion devices the linkage connecting the trigger to the lock catch forms a direct connection, the whole release and percussion device is unavoidably actuated, and the percussion pin released, each time that the trigger is pulled for a snap. In addition, each time that a arm is loaded for snapping, the percussion pin must be set to its cocked position, thereby imposing a stressed condition upon the catch, the lock linkage, and the trigger.

This means that the percussion pin, the catch, and the associated linkage are operated unnecessarily when snapping, resulting in material wear and consequent increased backlash of the stressed parts of the release and percussion device.

An increase in the backlash between the various elements of the device is harmful, inter alia, because it significantly delays the reaction time of the release mechanism, which unsettles the shooting.

The idle operation of the above-mentioned elements, moreover, causes a significant wear of the springs and the tension means co-operating with such elements.

A further drawback of the above devices is that, the trigger and the linkage being associated with the percussion pin catch directly, the large thrust force (typically several tens of kilograms) produced by the percussion pin bias spring implies large rubbing pressures and, hence, undesired material wear, both in respect of the percussion pin catch and the elements downstream of it.

Thus, to ensure a long-term consistent and reliable performance that is required for a sports pistol, prior art release and percussion devices have called for regular and costly maintenance, including inter alia frequent recalibration of the springs and of the tension means, and short-term replacement of linkage parts and other elements utilized in such devices.

It should be mentioned lastly that arms which utilize release and percussion devices of the kind described above require a special safety sear to prevent the percussion pin from shooting the projectile while snapping, under the urge of the spring. It is clear that such sear mechanisms further increase the arm complexity and cost.

Because of all these drawbacks, prior art release and percussion devices are ill-suited to sports arms,

while in any case involving expensive and constant maintenance by the user.

Summary of the Invention

The problem underlying this invention is to provide a release and percussion device, particularly for sports arms, which is reliable and accurate, on the one side, and is simple and inexpensive to make, durable, and requires no maintenance at frequent intervals, on the other.

In particular, the underlying problem of this invention is to provide a release and percussion device which allows of a limited functional use of the components of the device, consistent with the kind of shot foreseen (whether resulting in ejection of the projectile or otherwise), with none of the aforementioned drawbacks of the prior art.

The problem is solved, according to the invention, by a release and percussion device as indicated above being characterized in that the percussion pin and the trigger can be set to the cocked position independently of each other.

Advantageously, by having the trigger cocked independently of the percussion pin, and vice versa, the operation of the percussion pin and associated elements can be disjoined from that of the trigger, so that the trigger can be effectively squeezed whenever desired, e.g. for snapping, without bringing to work the percussion pin side of the device unnecessarily.

In fact, when an arm is to be operated in the snapping mode, it is no longer necessary to bring the whole release and percussion device to its loaded setting, but only the trigger, and the percussion pin is advantageously left uncocked. Thus, the percussion pin and its associated elements of the device would only be used for actual shooting, with both the trigger and the percussion pin in the cocked position.

In this way, the problem of excessive material wear, as well as the need for frequent maintenance and continued adjustment of the release and percussion device, is substantially overcome.

In particular, by having the percussion pin mechanism dissociated from the trigger mechanism, the latter is advantageously relieved of the heavy stress imposed by the bias spring of the percussion pin, and the percussion pin mechanism is only brought into play when actually shooting, thereby greatly reducing the wear and tear on either mechanisms.

Furthermore, since in the release and percussion device of this invention the percussion pin is not operated for snapping, it is no longer necessary to provide the arm with complicated and expensive sear means.

Accordingly, the present invention allows, in a simple and effective way, to obtain a release and percussion device which is highly reliable, durable in time and virtually maintenance-free, and thus well adapted for use in sports arms.

It should be noted in this respect that having the trigger mechanism disjoined from the percussion pin mechanism contradicts the prior art teaching that a separation of these mechanisms is inherently "disadvantageous" to the operation of a arm because it may introduce undesirable delay between the trigger actuation and the actual ejection of the projectile. According to this teaching, it has always been regarded necessary to have the trigger linked to the percussion pin in a manner as direct as possible, to avoid delays in the response of the release and percussion device.

The invention features and advantages are more clearly brought out in the following description of an embodiment thereof, given by way of non-limitative example with reference to the accompanying drawings.

Brief Description of the Drawings

In the drawings:

- Figure 1 is a longitudinal section view showing schematically a release and percussion device according to the invention, with both the percussion pin and trigger in the uncocked position;
- Figure 2 is a longitudinal section view showing schematically a release and percussion device according to the invention, with the percussion pin in the uncocked position and the trigger in the cocked position;
- Figure 3 is a longitudinal section view showing schematically a release and percussion device according to the invention, with both the percussion pin and the trigger in the cocked position.

Detailed Description of a Preferred Embodiment

A release and percussion device according to this invention is shown generally by 1 in Figures 1-3.

As will be explained hereinafter, the device 1 is specifically intended for sports arms -- whether firearms or otherwise -- such as target shooting pistols and rifles, but preferably for compressed air or CO_2 rifles and pistols.

However, its use is not limited to sports arms, and may include defence arms.

The release and percussion device 1 comprises a percussion pin 2 which is operated by respective actuation means represented by a spring 3 inside a transfer chamber 4, a first catch 5 for holding the percussion pin 2 in a cocked position (Figure 3), and a trigger 6 which co-operates with the first catch 5 to release the percussion pin 2 from its cocked position (Figures 1 and 2).

The above elements are disposed in the area of the case 7 and the stand 8 of a arm, generally designated by 9, which consists here of a compressed air pistol of conventional type.

The pistol 9 also includes a barrel 10 for ejecting the projectile (not shown) from the arm, which is only partially depicted in Figures 1-3 and fits in case 7. The barrel 10 is in fluid communication, through the chamber 11 and conduits 12-13, with a compressed air container (not shown) usually positioned under the barrel 10.

Provided inside the chamber 11 is a control valve 14 for controlling the air flow from the container to the barrel 10. The valve 14 is suitably loaded against a detent 15 in the chamber 11 by a spring 16, and includes a pin 17 co-operating with the percussion pin 2.

In Figures 1-3, generally shown by 18 are thrust caps for the springs 3 and 16, respectively, and generally shown by 19 are means of introducing the projectile into the barrel 10.

Advantageously in the release and percussion device 1 of this invention, the percussion pin 2 and the trigger 6 can be set to the cocked position independently of each other, as shown in Figures 2 and 3.

In particular, the mechanism 1 advantageously includes first means 20a and 20b of cocking the percussion pin 2, and second means 21, separate from the first, of cocking the trigger 6.

Referring to the embodiment of this invention shown in Figures 1-3, the independent cocking of the percussion pin 2 and the trigger 6 is made possible by having the mechanism portion relating to the percussion pin 2 suitably separated from that relating to the trigger 6.

For the purpose, the release and percussion device 1 is advantageously provided with a pin 22 which is actuated by a spring 23 and co-operates with the first catch 5. A second catch 24 is also provided for holding the pin 22 in the cocked position, and co-operates with the trigger 6.

In particular, the pin 22 is preferably operated by means of a lever 25 arranged to co-operate with the spring 23 and the second catch 24.

The lever 25 has a first end 25a which is suitably shaped for convenient retention by the second catch 24, and has a second end 25b on which the pin 22 bears. In addition, the lever 25 is hooked onto the spring 23 at a location close to the end 25b, such that the spring 23, by abutting a stop 26, enables the lever 25 to urge the pin 22 up toward the first catch 5.

Preferably, the first catch 5 is connected directly to a lever 27 which has one end 27a adapted to receive the pin 22 when operated by the lever 25.

Advantageously, provided at the second end 25b is a rolling element 28, preferably a ball or a ball bearing of the cylindrical type, effective to minimize any frictional drag between the lever 25 and the pin 22, as well as between the second means 21 of cocking the trigger and the lever 25. The element 28 is preferably journalled on the lever 25 at the end 25b (as indicated by 29).

The various levers and catches of the release and percussion device 1 are conventionally pivoted about pivots, collectively designated 30, mounted to the case 7 and the stand 8, respectively, of the pistol 9.

The pivots 30 associated with the trigger 6, the catch 24 and the lever 25 are advantageously provided with suitable rolling elements, such as ball bearings, to facilitate the pivotal movements of the linkage parts by reducing their friction about the pivots 30.

Moreover, bias springs, collectively designated by 31, are provided at the trigger 6 and at the first and second catches 5 and 24, respectively, to resist rotation movement of their associated elements.

In particular, the springs 31 associated with the trigger 6 and with the second catch 24 are advantageously hooked with respective ends into suitable openings, collectively designated by 32, formed through the elements 6 and 24 as well as through two plates 33a which jut out of the supporting wall 33 of the stand 8 (for clarity, only one plate 33a is shown in Figures 1-3). These springs 31 function to produce a predetermined amount of resistance to pressing back the trigger 6. It is, therefore, necessary to arrange for the bias force of the springs 31 to be adjustable to suit the user's preference or the conditions of use of the arm. For the purpose, the plates 33a can be suitably rotated about the pivot 33b.

It should be mentioned in this respect that, in this invention, the springs 31 co-operating with the trigger 6 and the second catch 24 are advantageously disposed at a peripheral location of the device 1, easy to reach for adjustment, because not covered by the outer walls (not shown) of the case 7.

In order for the transmission of the release from the trigger 6 to the percussion pin 2 to be as effective and direct as possible, so as to minimize any possible delay in the response of the device 1, the second catch 24 is advantageously connected directly to the trigger 6 by a lug 6a thereof.

The device 1 also includes a grub screw 41, received in the support 8 at the second catch 24, for controlling the catch rotation.

The mechanism related to the percussion pin comprises the elements designated by 2, 3, 5, 27 and 27a, 30 and 31. The trigger mechanism comprises the elements designated by 6 and 6a, 22-26, 30 and 31. As can be appreciated from Figures 1-3, these mechanisms are advantageously independent of one another, although forming a kinematically linked whole.

Advantageously, the second means 21 of cocking the trigger 6 comprise an arm 34 of predetermined length, and are carried on a lever 35 pivoting about a pivot 36. Preferably, the arm 34 is set at a 90-degree angle to the lever 35, and the latter is allowed to pivot about the pivot 36 through a corresponding angle.

Upon the lever 35 being pivoted through a predetermined angle, e.g. within the range of 5° to 30°, the arm 34 sets the pin 22 to the cocked position, so that the trigger 6 is also set for shooting (figure 2).

In a preferred embodiment of the invention shown in Figures 1-3, the first means 20a and 20b of cocking the percussion pin 2, and the second means 21 of cock-

ing the trigger 6 are mounted to a single lever 35 and act on the percussion pin 2, respectively the trigger 6, at two different angles of rotation of the lever 35. In this example, the rotation angle for cocking the percussion pin 2 is larger than the rotation angle for cocking the trigger 6, being for example of 90° and 15°, respectively (Figures 2 and 3).

In alternative embodiments of this invention, not shown, the means of cocking the percussion pin and the means of cocking the trigger may be associated with independent separate levers, such that the percussion pin can be set for shooting with the trigger in the uncocked position, for example.

The first means 20a and 20b of cocking the percussion pin 2 are conventional and no further described herein. In general, such means comprise a detent 20a driven by the lever 35 and co-operating with a shoulder 20b attached to the percussion pin 2. By pivoting the lever 35 through a predetermined angle, e.g. of 90 degrees as shown in Figure 3, the detent 20a is brought against the shoulder 20b so as to push the percussion pin 2 in the opposite direction from that of the pin 17 on the lever 14, until it engages the first catch 5 in the cocked position.

In the example of Figures 1-3, the lever 35, detent 20a, and means 19 of introducing the shot into the barrel 10 are combined together. The detent 20a, in fact, is defined at a remote end of the means 19 from the barrel 10.

Further, the means 19 are provided with a peg 37 mounted a predetermined distance away from the detent 20a. The peg 37 engages in a first slot 38 formed at a suitable angle through the lever 35, and a second, horizontal slot 39 formed through the vertical wall 40 of the case 7.

As the lever 35 is pivoted about the pivot 36, the peg 37 is forced back by the slots 38 and 39 horizontally along the slot 39, thereby entraining backwards the means 19 and detent 20a as well.

The operation of the release and percussion device according to this invention will now be described.

Referring to Figure 1, the release and percussion device 1 is in a rest condition, with the percussion pin 2 and the trigger 6 uncocked. This is a condition which follows immediately that of snapping or actually shooting to eject the projectile from the barrel 10.

At this stage, the lever 25 and percussion pin 2 are disengaged from their respective catches 24 and 5.

In particular, the lever 25 is rotated slightly in the counterclockwise direction by the action of the spring 23 and urges the pin 22 against the end 27a of the lever 27. The percussion pin 2, itself biased by the spring 3, is at a forward position in the chamber 4 in contact with the pin 17 of the valve 14, the valve being in its closed position against the detent 15 of the chamber 11.

Further, the lever 35 is fully down onto the case 7 of the pistol 9, and the loading means 19 are positioned at the entrance 42 of the barrel 10. In this position, the head 43 of the means 19, which acts to introduce the shot into the barrel 10, is suitably located immediately downstream of the conduit 13.

Referring to Figure 2, upon the lever 35 being rotated through a predetermined angle (11° in this example), the arm 34 of the second means 21 of cocking the trigger 6 is moved to act on the lever 25, and precisely on the rolling element 28 at the end 25b. Thus, the lever 25 is rotated clockwise until the end 25a engages with the second catch 24.

In this position, the trigger 6 is therefore cocked, and the pistol 9 can advantageously be used for snapping without the percussion pin mechanism 2 being in any way involved.

In fact, the range of pivotal movement of the lever 35 is definitely insufficient to actuate the first means 20a and 20b of cocking the percussion pin 2, resulting in the percussion pin remaining disengaged.

For snapping, the trigger 6 is squeezed with a pressure of predetermined magnitude to rotate the lug 6a which, in turn, causes the second catch 24 to pivot (in the opposite direction) and allows the lever 25 to become disengaged so that, under the urge from the spring 23, it pushes the pin 22 against the lever 27.

After the snap, the release and percussion device 1 is restored to the uncocked condition shown in Figure 1.

On the other hand, for actually shooting with ejection of the projectile through the barrel, the lever 35 is fully rotated as shown in Figure 3.

In this way, the trigger 6 is cocked by the action of the arm 34, and at the same time the percussion pin 2 is moved back by the combined actions of the detent 20a and of the shoulder 20b to become engaged with the first catch 5. The full rotation of the lever 35 also causes the means 19 to move back to allow the positioning of the shot at the entrance 42 of the barrel 10.

In this case, on squeezing the trigger 6, the lever 25 is released to urge the pin 22 against the lever 27, which will, in turn, rotate the first catch 5 and disengage the percussion pin 2. Under the bias of the spring 3, the percussion pin is caused to strike against the pin 17 of the valve 14, which is temporarily lifted off the detent 15 in its backward movement, thereby allowing a predetermined amount of air to flow from the compressed air container into the barrel 10 through the conduits 12-13. Under the high pressure (typically in the range of 20 to 80 bar) of the air blast, the projectile is ultimately blown out of the pistol 9.

After the shot, the release and percussion device 1 is restored to the uncocked position shown in Figure 1.

It should be understood that, before shooting, the lever 35 must be suitably lowered back onto the case 7 as shown in Figure 1 in order for the head 43 of the means 19 to load the shot into the barrel 10, suitably shutting off the entrance 42.

It will be appreciated from the foregoing description of the operation of the release and percussion device according to this invention that the mechanism relating

to the percussion pin 2 and the mechanism relating to the trigger 6 would only be actuated simultaneously on the occasion of a projectile being actually shot from the arm, whereas for snapping, only the trigger mechanism is brought to operate.

A number of advantages accrue from the release and percussion device 1 described hereinabove.

First, the trigger 6 can be cocked independently of the percussion pin 2, so that it becomes unnecessary to impose any stress on the percussion pin mechanism in the snapping mode, resulting in less wear and tear of the materials and reduced need for adjustment and maintenance of the linkage and associated springs.

Second, by having the percussion pin mechanism disconnected from the trigger mechanism, the latter can be operated in ideal conditions of stress and wear, without the adverse effect of friction induced by the bias force of the spring 3, so that the various parts involved will only require occasional routine maintenance and adjustment.

Moreover, the introduction of technical features such as pivotal elements combined with the specific layout of the linkage results in a release and percussion device wherein response delays and friction between the various elements can be reduced to trivial amounts, thereby enhancing shooting accuracy and reducing material wear.

Finally, the extreme mechanical and constructional simplicity of the inventive device are worth mentioning which, combined with the high accuracy and reliability of this release and percussion device make it highly suitable for use in sports arms.

Claims

1. A release and percussion device, particularly for sports arms, of the type comprising:

   - a percussion pin (2) operated by respective actuation means (3);
   - a first catch (5) for holding said percussion pin (2) in a cocked position; and
   - a trigger (6) co-operating with said first catch (5) to release the percussion pin (2) from said cocked position;

   characterized in that said percussion pin (2) and said trigger (6) can be cocked independently of each other.

2. Device according to Claim 1, characterized in that it further comprises:

   - first and second means (20a-20b;21) of independently cocking said percussion pin (2) and said trigger (6), respectively.

3. Device according to Claim 2, characterized in that it further comprises:

   - a pin (22) actuated by a spring (23), co-operating with said first catch (5) to disengage the percussion pin (2);
   - a second catch (24) for holding said pin (22) in the cocked position, co-operating with said trigger (6).

4. Device according to Claim 3, characterized in that said pin (22) is actuated by a lever co-operating with said spring (23) and said second catch (24).

5. Device according to Claim 4, characterized in that a rolling element (28) is provided between said pin (22) and said lever (25).

6. Device according to Claim 3, characterized in that said second catch (24) is connected to said trigger (6) directly.

7. Device according to Claim 3, characterized in that said second means (21) of cocking the trigger are disposed on a lever (35) adapted for rotation about a pivot (36) and comprise an arm (34) of predetermined length effective to set said pin (22) in the cocked position upon the lever (35) being rotated through a predetermined angle.

8. Device according to Claim 2, characterized in that said first and second means (20a-20b;21) of cocking the percussion pin, respectively the trigger, are disposed on a single lever (35) adapted for rotation about a pivot (36) and act on the percussion pin (2), respectively the trigger (6), at two different angles of rotation of the lever (35), the angle of rotation for setting the percussion pin (2) to the cocked position being larger than the angle of rotation for setting the trigger (6) to the cocked position.

9. Sports pistol, characterized in that it comprises a release and percussion device as claimed in one of Claims 1-8.

10. Sports rifle, characterized in that it comprises a release and percussion device as claimed in one of Claims 1-8.

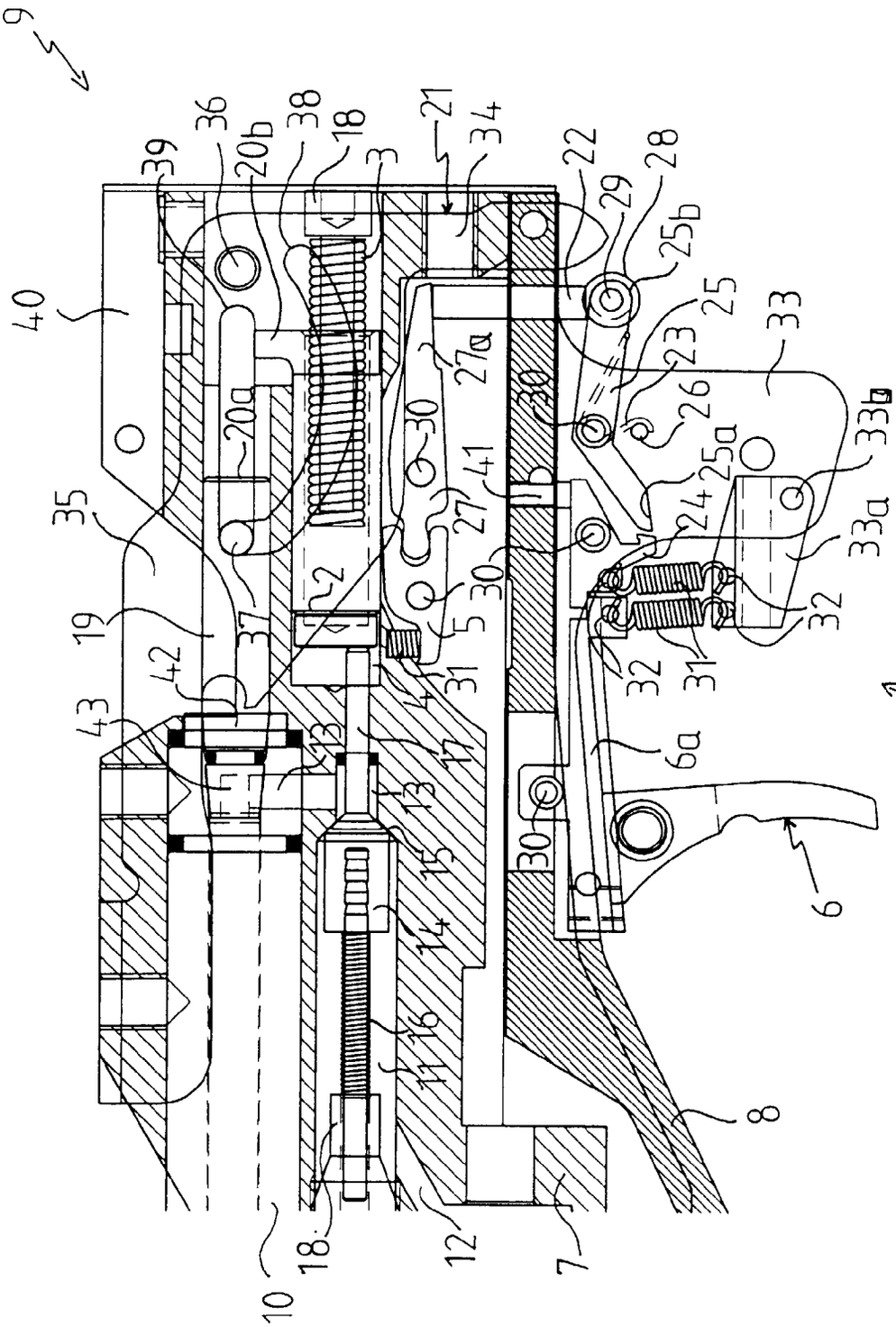
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FIG.1

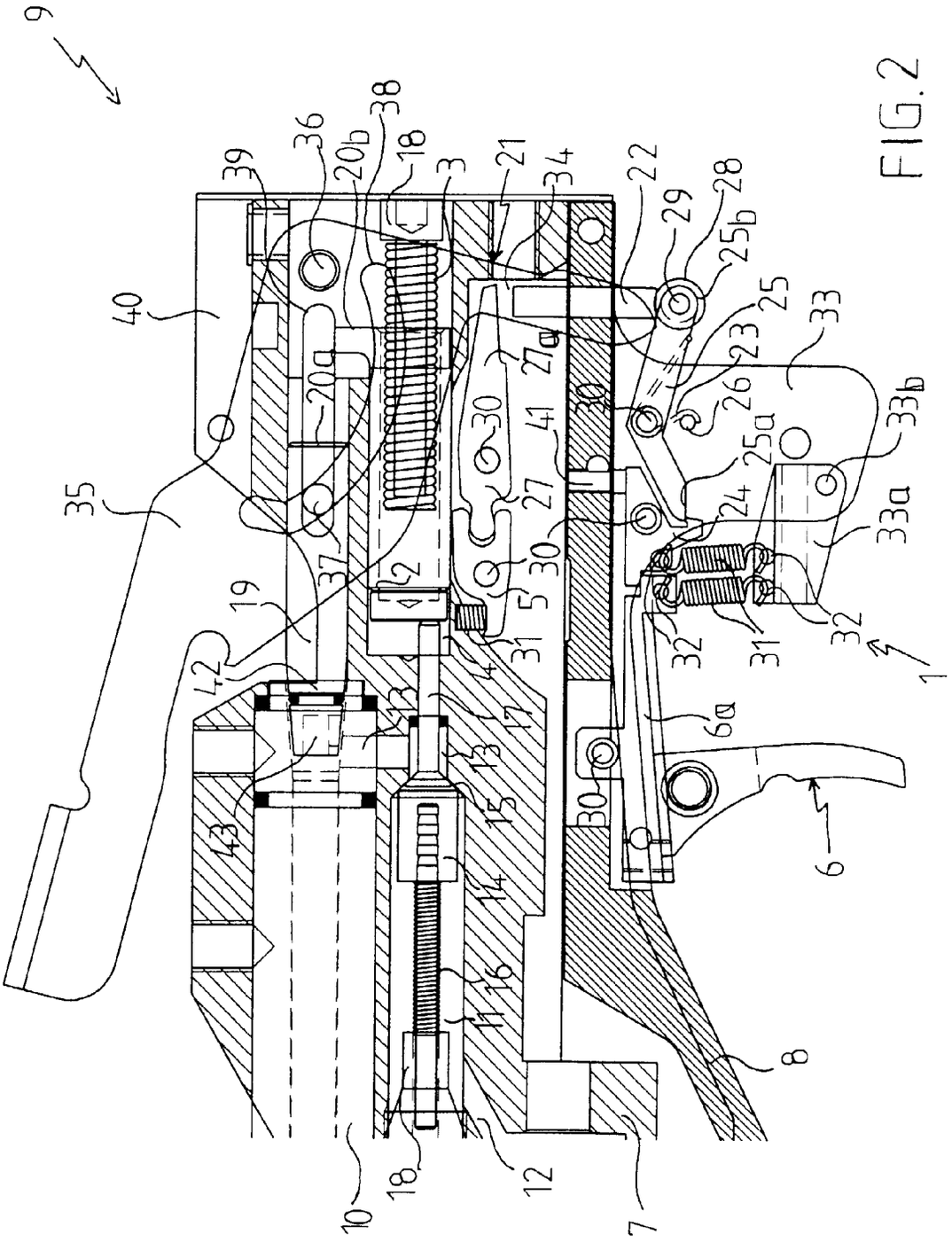
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FIG. 2

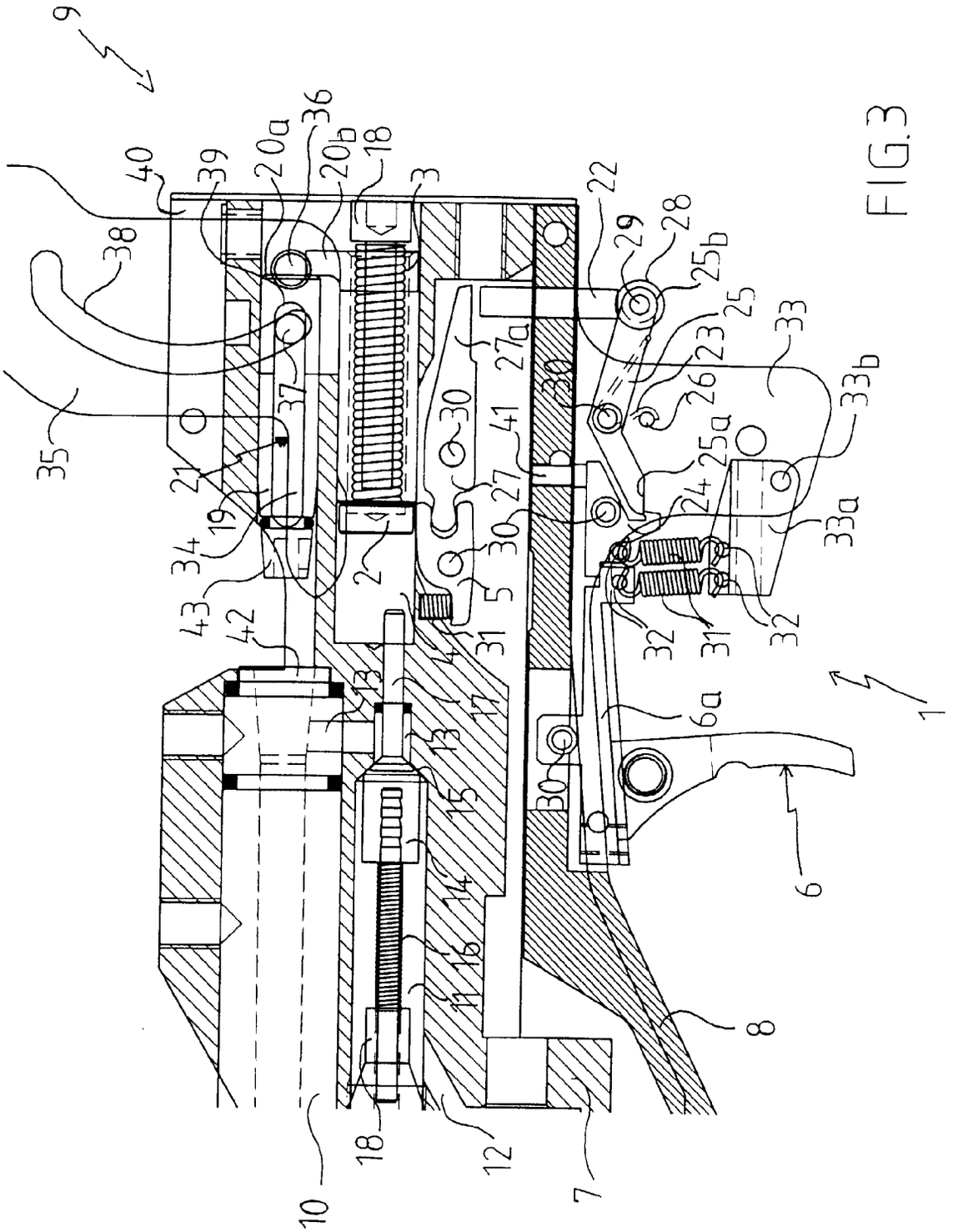
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FIG.3