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(54) **Softair gun having a control circuit and method for retrofitting**

(57) A simulated weapon comprising a spring compressor (2) for generating a compressed air flow, a movable positioning device (3) for loading a pellet (4) in a shot chamber (5) which receives the compressed air generated by the spring compressor (2), an actuator (6) for controlling the spring compressor (2) and the positioning device (3), a magazine (7) for feeding the shot chamber (5) with pellets (4) and a trigger (8), the simulated weapon further comprising a first sensor (23; 40) for detecting a status of the trigger (8) and at least a second sensor (24; 25) for detecting the connection of the magazine (7) so that the pellets (4) are fed into the shot chamber (5) or that the magazine (7) should be replaced, and an electric or electronic control device (22) configured to prevent the activation of the actuator (6) by means of the trigger (8) if the magazine (7) is not connected so as to feed the pellets (4) and/or if the magazine (7) is to be replaced.

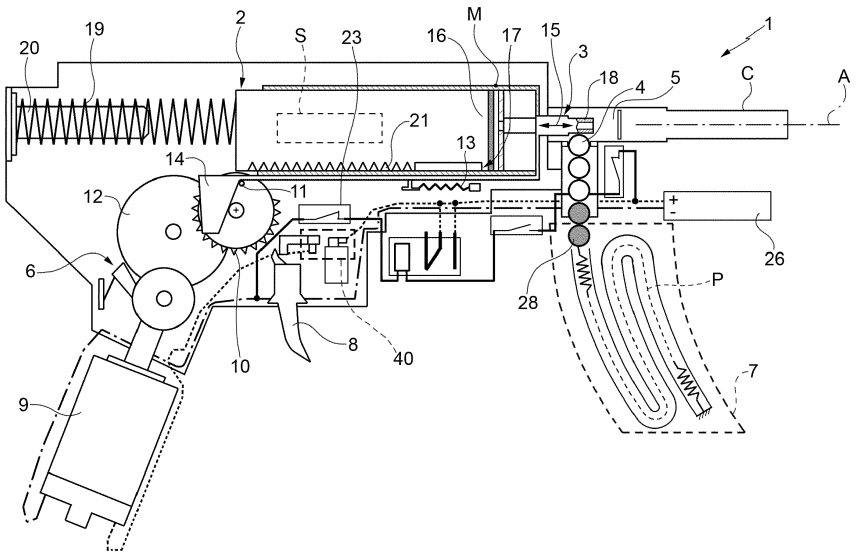

FIG. 1

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Description

[0001] The present invention refers to a simulated weapon with energy not exceeding 8 joule, preferably less than 2 joule, in particular a weapon with rigid pellet ammunition. A munition can be considered a rigid pellet when it has a size of less than 7 millimetres and a weight of less than 1 gram. In general, a rigid pellet has a substantially spherical shape and is made of a non-metallic material, for example, a polymer.

[0002] The discipline that uses a simulated weapon with rigid pellet ammunition is also known as 'softair' and differs from other disciplines that use simulated weapons with collapsible munition filled with a tracer fluid, for example a coloured paint, which is splattered when the shot hits a body and breaks.

[0003] A simulated weapon is intended to faithfully reproduce the operation of a firearm. In particular, the softair discipline is characterized by a high level of accuracy in the reproduction of the firearm's operation. One aspect hitherto susceptible of improvement in simulated weapons with rigid pellet ammunition is the simulation of the condition in which the magazine is empty, that is in the condition of having no further shots, and/or the condition in which the magazine is not present.

[0004] In such conditions, the user of the firearm just feels the push of the trigger without any shot being fired or any impulse being developed. Instead, in a softair simulated weapon, the user feels the air discharge in such a situation, making the usage experience not very realistic.

[0005] Patent US-A1-2007000483, considered to be the prior art document closest to the present invention, describes a simulated weapon provided with a mechanical system comprising a lever for detecting the presence of a pellets leaving a magazine. This system comprises an intricate set of moving parts, both on board and external to the magazine. These moving parts are exposed to dust and dirt and may seize up. In addition, the particular shape of the magazine adapted to the simulated weapon in the document prevents the use of other types of magazine and renders use of the simulated weapon rather inflexible. Finally, the document does not disclose how the lever for detecting pellets might operate if the magazine was extracted with shots still inside it.

[0006] Patent EP2698594, secret at the priority date of this patent application, generically describes a control system capable of detecting the presence of a magazine or running out of ammunition. The module for detecting the magazine is not described in particular detail. Furthermore, the document does not disclose anything on the method of detecting when the ammunition runs out. In particular, the document does specify the operation of the control system when a user disconnects a magazine still holding ammunition.

[0007] The object of the present invention is to provide a simulated weapon capable of faithfully reproducing the out of ammunition condition and, at the same time, at least partially solving the above-specified drawbacks.

[0008] The object of the present invention is achieved by means of a simulated weapon according to claim 1 and by means of a method for retrofitting a simulated weapon according to claim 8.

[0009] The invention shall now be described with reference to the accompanying drawings, which illustrate a non-limitative embodiment, in which:

- Figure 1 is a schematic section of a simulated weapon according to the present invention;
- Figure 2 is a diagram of a control circuit installed on board the simulated weapon of Figure 1;
- Figure 3 is a diagram of a control circuit according to a second embodiment of the present invention; and
- Figure 4 is a diagram of a control circuit according to a third embodiment of the present invention.

[0010] In Figure 1, reference numeral 1 indicates, as a whole, a simulated weapon comprising a spring compressor 2 for generating a flow of compressed air, a positioning device 3 for loading a pellet 4 into a shot chamber 5 that receives compressed air generated by the spring compressor 2, an actuator 6 for controlling the spring compressor 2 and the positioning device 3 in a coordinated manner, a magazine 7 for feeding the shot chamber 5 with pellets 4 and a trigger 8 for controlling the actuator 6.

[0011] In particular, the actuator 6 can be rotary and comprise an electric motor 9, a rotating toothed sector 10, a cam 11, for example an eccentric pin rotating in a coordinated manner with the toothed sector 10, and a reduction gear 12 for connecting the electric motor 9 to the toothed sector 10 and/or to the cam 11. The cam 11 operates the positioning device 3, which is kept in contact with the cam 11 by a spring 13.

[0012] The positioning device 3 slides along an axis A, preferably parallel to that of the spring compressor 2, and comprises a portion 14 in contact with the cam 11 and a head 15 movable to an extracted position and a retracted position inside the shot chamber 5. In the extracted position, no pellet 4 can enter the shot chamber 5; in the retracted position, the head 15 opens the shot chamber 5 and allows a pellet 4 to enter therein, ready for being ejected by the airflow generated by the spring compressor 2.

[0013] The spring compressor 2 comprises a piston 16 movable inside a fixed compression chamber 17 arranged at the opposite end of the shot chamber 5 with respect to the head 15. In addition, the compression chamber 17 is fluidically connected to the shot chamber 5 by means of an opening 18, for example a through hole, defined by the head 15 such that the compressed air generated by the piston 16 reaches the shot chamber 5 to eject the pellet 4. The compression chamber 17 also communicates with the outside environment through channels S that are uncovered and covered when the

piston 16 moves backwards and forwards, respectively, so as to discharge air from and charge air into the compression chamber 17.

[0014] Furthermore, the piston 16 is held in a dead centre position by a spring 19 having an initial preloading that is adjustable, for example, by means of an adjustment screw 20, to alter the characteristics, for example the pressure, of the airflow that expels the pellet 4 from the shot chamber 5 along a barrel C of the simulated weapon 1. The piston 16 is operated against the action of the spring 19 through the selective engagement of the toothed sector 10 with a rack 21 integral with the piston 16. In particular, the number of teeth of the toothed sector 10 determines the travel of the piston 16 inside the compression chamber 17 to reach a dead centre at which the load of the spring 19 is greatest.

[0015] According to the present invention, the simulated weapon 1 further comprises an electric and/or electronic control circuit 22 for controlling the activation of the electric motor 9 on the basis of the trigger 8 and at least one further signal S1, S2, respectively indicative of: the mechanical connection of the magazine 7 to a frame of the simulated weapon 1 for feeding pellets 4 into the shot chamber 5 and/or the presence of pellets 4 in the magazine 7.

[0016] Preferably, the control circuit 22 is such that the electric motor 9 is only activated if the signal of the trigger 8 is detected in addition to at least one of the signals S1, S2. In this way, the simulated weapon 1 does not fire if the magazine 7 is not inserted for feeding the pellets 4 and/or if the magazine 7 is inserted but empty or in an equivalent condition in which the magazine should be replaced. In particular, some magazines can be replaced even if not completely out of pellets 4.

[0017] According to a preferred embodiment, the control circuit 22 comprises a sensor 23 for generating a signal regarding the status of the trigger 8, a sensor 24 for generating signal S1 regarding the magazine 7 and a sensor 25 for generating a signal S2 regarding the status of the pellets 4. The sensors 23, 24 and 25 can be connected in series by means of a low-current branch, i.e. less than 1 ampere, of the control circuit 22 when the circuit is electric. According to the diagram in Figure 2, the control circuit 22 also comprises a high-current power supply branch, i.e. current level higher than that of the low-current branch, for example less than 4 ampere, to connect the electric motor 9 to a battery 26, and a main switch 27 to connect/disconnect the electric motor 9 from the battery 26. Advantageously, the main switch 27 is controlled and, in particular, is a relay having a coil B controlled by the sensors 23, 24 and 25. According to the embodiment shown in Figure 2, sensor 23 is additional with respect to a pre-existent trigger sensor 40, in particular a switch, placed on board the simulated weapon 1 along the high-current branch. In this case, the sensor 23 is configured to close before the pre-existent trigger sensor 40 so that, if all the other conditions are verified by sensors 24 and 25, the low-current branch closes, activating the coil B and closing the main switch 27. In this way, the actuator 6 is activated immediately after closure of the pre-existent trigger sensor 40 and any delays due to the electrical dynamics of closing the low-current branch are avoided. Furthermore, sensor 23 closes when the trigger 8 is pulled, but opens when the trigger returns to the rest position: in this way, battery power is not consumed under firing conditions, i.e. when sensor 25 indicates the presence of pellets 4 and the magazine 7 is inserted and functioning.

[0018] Alternatively, it is e possible to omit sensor 23 and connect sensor 24 between the pre-existing sensor 40 and the electric motor 9 at point D. Any delays in activation of the actuator 6 can be reduced if the main switch 27 is a MOSFET or other semiconductor-controlled switch.

[0019] The control circuit 22 can be implemented both electronically and electrically, the sensors 23, 24 and 25 being installed in opportune positions on board the weapon 1 to detect the condition of interest and generate the associated signal.

[0020] Advantageously, sensor 23 is an on-off sensor, for example a switch, which is open when the trigger 8 is at rest and closes when the trigger 8 is pulled; sensor 24 is an on-off contact sensor, for example a switch closed when the magazine 7 is connected in an appropriate manner; and sensor 25 is a magnetic, capacitive or optical contactless sensor, for example a LED light sensor. As shown in Figure 1, the sensor 25 is not on board the magazine 7 and is fixed with respect to sensor 24 and/or sensor 23 and/or the battery 26. In this way, the magazine 7 can be built in a simple and inexpensive manner. This further increases the flexibility of the simulated weapon 1 because it is easier to use the magazines of other simulated weapons. According to a preferred embodiment of the present invention, the magazine 7 internally houses the pellets 4 in sequence and not randomly. In particular, the magazine 7 internally comprises a guide defining a path P along which the pellets 4 are arranged in at least one line, at the end of which a spring-loaded ejector (not shown) pushes the pellets 4 towards the shot chamber 5 when the magazine 7 is connected to the frame of the simulated weapon 1. The ejector comprises an end portion 28 made of a metallic and/or magnetic material suitable for being detected by sensor 25 and, in the case where sensor 25 is not an optical one, both the magazine 7 and the pellets 4 are made of a nonmagnetic material. In particular, when the end portion 28 pushes the last pellet of the magazine 4 towards the shot chamber 5 by means of its spring, sensor 25 is in a position to detect the presence and/or the position of the end portion 28 and consequently send a signal indicating that the magazine 7 is empty and/or should be replaced. It is particularly advantageous that the end portion 28 does not excessively jut out from the magazine 7 and, in particular, remains inside the latter even in the condition of maximum extraction. In this way, it is more likely to avoid breakage due to use when a magazine 7

needing to be filled is put in rucksacks, pockets, etc., where an excessively protruding end could easily break.

[0021] According to the present invention, it is possible upgrade a pre-existing simulated weapon by means of a specially provided upgrade kit comprising at least sensors 24 and 25 and the main switch 27, as well as the electrical connections necessary for connecting the sensors and the main switch 27 to the battery 26. In addition, the end portion 28 could also be provided if it was not already provided on board the magazine.

[0022] This kit is used to upgrade a simulated weapon originally devoid of the control 22 by mounting sensors 24 and 25 in opportune positions on board the weapon to be upgraded. In addition, it is necessary to intercept the power supply line between the electric motor 9 and the battery 26 to mount the main switch 27 and connect the latter to the sensors 23, 24 and 25 so that a round can only be fired if signal S1 and/or signal S2 are such that, respectively, the magazine is inserted and the magazine can feed the shot chamber 5 with pellets 4. In general, the battery 26 is connected to the high-current branch by a quick electrical connector comprising a male part M2 and a female part F1. In particular, the pre-existent trigger sensor 40 is arranged between this quick electrical connector and the actuator 6 on board the simulated weapon 1. According to one aspect of the present invention, the low-current branch and the main switch 27 are connected to opportunely configured electrical lines comprising a quick electrical connector with a male part M1 connectable to female part F1 and a female part F2 connectable to male part M2. According to this embodiment, the low-current branch comprises sensor 23 and it is therefore possible to upgrade a pre-existing simulated weapon without modifying the original electric or electronic circuit, i.e. that at the ends of the quick electrical connectors M2 and F1. According to the embodiment shown in Figure 2, this original circuit comprises the actuator 6, the pre-existent trigger sensor 40 and the battery 26.

[0023] According to the embodiment in Figure 3, the simulated weapon 1 also comprises a virtual breech bolt slide 29 (only shown schematically in Figure 3) and a mechanical or electromechanical blocking device 30 to hold the virtual breech bolt 29 in a retracted position. In particular, the virtual breech bolt 29 is a slide movable to a retracted position to reproduce the effect of the breech bolt of a firearm that loads a new round with the breech bolt retracted, and a forward position in which the condition of a round in the chamber ready for firing is reproduced. The virtual breech bolt 29 on board the simulated weapon 1 does not take part in the expulsion of the pellet 4 and allows increasing the realism of the replica. In particular, a fluidic duct (not shown) can be connected to the compression chamber 17, for example at point M, to draw off a flow of compressed air and operate a spring cylinder connected to the virtual breech bolt 29 to take the latter to the extracted position. Normally, the spring of the spring cylinder takes the virtual breech bolt 29 to the retracted position that simulates a round in the chamber ready to fire.

[0024] Advantageously, the blocking device 30 is operated by a sensor 31 via which the virtual breech bolt 29 is blocked by the blocking device 30 when the empty or replacement condition the magazine 7 is detected. In this condition, as in a firearm, the blocking device 30 holds the virtual breech bolt 29 in the extracted position until the sensor 24 detects the extraction of the empty magazine 7 or the condition that the magazine 7 should be replaced.

[0025] As shown in Figure 3, to enable operation according to the preceding paragraph, the sensor 25 can be a switch arranged to exclude sensors 23 and 24, which in this case can in turn comprise respective switches, when the magazine 7 must be extracted on the basis of sensor 25, and sensor 31 and the blocking device 30 are therefore activated to block the virtual breech bolt 29 in the extracted position.

[0026] In addition, preferably both the blocking device 30 and sensor 31 are conveniently installed between male part M1 and female part F2 so as not to require making any permanent changes to the pre-existent electric circuit of the simulated weapon 1.

[0027] The advantages attainable by means of a simulated weapon 1 according to the present invention are the following.

[0028] The control circuit 22 enables effectively simulating the condition of running out of ammunition.

[0029] In particular, when both sensor 24 and sensor 25 are present and connected in series, the actuator 6 is not activated when the magazine 7 is disconnected, when the magazine 7 is connected but empty, or when the magazine 7 is disconnected and still has shots to fire.

[0030] Furthermore, sensor 24 can be configured to be activated by any magazine and so it is thus possible that the simulated weapon 1 operates by simulating the connection/disconnection of the magazine without simulating running out of pellets 4 as well. The fact that sensor 25 is not on board the magazine 7 and is fixed with respect to sensor 24 and/or sensor 23 and/or the battery 26 makes the magazine 7 simple and inexpensive to build and to also replace magazines not set up for the check on running out of pellets.

[0031] As shown in Figure 1, sensor 25 preferably detects the end portion 28 by being placed between the magazine 7 and the axis A of the shot chamber 5. In particular, magazines having a plastic portion through which the pellets 4 come out are quite widespread. The plastic portion can be carried by shell made of plastic or another material, metal for example, inside which the pellets 4 are present. Therefore, when sensor 25 is in the above-indicated position, the material brought close to sensor 25 is plastic and not metal. This enables the magazine 7 to be set up for detection by sensor 25 in a simpler manner, especially when the latter is a magnetic sensor. In this way, the simulated weapon 1 is particularly suited for using numerous types of magazines.

[0032] In addition, an optical, magnetic or capacitive contactless sensor can be quickly cleaned of dust or other contaminants, in the case of an optical sensor, and/or require less maintenance in the case of a magnetic or capacitive sensor.

[0033] Furthermore, the structure of the control circuit 22 is made to have the least possible impact on a pre-existing electric circuit on board the simulated weapon 1 and this is particularly useful when the simulated weapon 1 is upgraded after being sold and the circuit 22 is not factory fitted.

[0034] In particular, by mean of the quick connectors M1 and F2, and when the electrical contact at point D is not made, no permanent change is made to the pre-existing electric circuit on board the simulated weapon and the switch 27 with the sensors 23, 24 and 25 can be disassembled in a reversible manner.

[0035] It is also possible to upgrade pre-existing simulated weapons as well.

[0036] Finally, it is clear that modifications can be applied to and variants made of the simulated weapon disclosed herein without departing from the scope defined in the appended claims.

[0037] For example, switch 27 could disconnect the pole not disconnected by the pre-existing trigger switch 40, so that a double-pole switch is defined that disconnects the battery 26 from the actuator 6 on both poles. In the example in Figures 2 and 3, switch 27 can disconnect the negative pole, in this way increasing the safety conditions of the simulated weapon 1.

[0038] Advantageously, switch 27 is arranged on its own printed circuit board; sensor 23 and sensor 24 are on a different printed circuit board from that of switch 27 and sensor 25 is mounted on a further printed circuit board. In this way, it is easier to carry out maintenance and/or replacements after installation on board the weapon 1 because only the printed circuit board with the associated component is replaced and not the entire system.

[0039] According to an alternative embodiment, the sensors 23, 24 and 25, and switch 27 can be bypassed by means of a selector 50, preferably manually operated by the user. When the selector 50 is set in a first position, the control system 22 and the sensors 23, 24 and 25 are operative; when the selector 50 is set in a second position (shown in Figure 4), the sensors 23, 24 and 25, and switch 27 do not affect the activation of the actuator 6 and the actuator 6 is operated exclusively via the pre-existing sensor 40. When the control device 22 comprises the selector 50 as shown in Figure 4, it is possible to provide for sensor 24 being contactless as well, in particular of the capacitive, optical or magnetic type. In this way, if a magazine is used that is without the end portion 28 and/or a magnet or other element fastened rigidly to the magazine for being detected by sensor 24, current does not pass in the low-current branch when the trigger 8 is pulled. It is therefore possible to increase the working life of the electrical/electronic components of the control circuit 22. Preferably, the selector 50 is mounted on the same printed circuit board as switch 27. Preferably, this board is arranged on board the simulated weapon 1 so that the user can commutate the selector 50 when the battery 26 is replaced. In addition, the selector 50 is connected to the high-current branch between quick connectors M1 and F2, so as to be installable on board the simulated weapon 1 together with the control device 22 (Figure 4).

[0040] Furthermore, a magazine can be easily prepared for being detected by contactless sensor 24; for example a magnet, an optical reflection component or a capacitive element, for example an element made of a ferromagnetic material, could be glued on the plastic head of the magazine by means of an adhesive.

[0041] Preferably, the sensors 23, 24 and 25 are electric or electronic.

Claims

1. A simulated weapon comprising a spring compressor (2) for generating a compressed air flow, a movable positioning device (3) for loading a pellet (4) in a shot chamber (5) which receives the compressed air generated by the spring compressor (2), an actuator (6) for controlling the spring compressor (2) and the positioning device (3), a magazine (7) for feeding the shot chamber (5) with pellets (4) and a trigger (8), the simulated weapon further comprising a first sensor (23; 40) for detecting a status of the trigger (8) and at least a second sensor (24; 25) for detecting the connection of the magazine (7) so that the pellets (4) are fed in the shot chamber (5) or so that the magazine (7) is replaced, and an electric or electronic control device (22) configured to prevent the activation of the actuator (6) by means of the trigger (8) if the magazine (7) is not connected so as to feed the pellets (4) and/or if the magazine (7) is to be replaced.

2. A simulated weapon according to claim 1, **characterized in that** said second sensor is a contactless sensor (25) for detecting the presence and/or the position in the said magazine (7) of a movable portion (28) inside the magazine (7) configured for pushing the pellets (4) into the shot chamber (5); and for generating a signal (S2) indicating that the magazine (7) shall be replaced.

3. A simulated weapon according to claim 2, **characterized by** comprising a third sensor (24) in series to the second sensor (25) for detecting the extraction and connection of the magazine (7) so that the pellets (4) are fed or not fed into the shot chamber (5) and in that the second sensor (25) is not on board the magazine (7).

4. A simulated weapon according to either of claims 2 or 3, **characterized in that** the second sensor (25) is located between the magazine (7) and an axis (A) of the shot chamber (5).

5. A simulated weapon according to any of claims 2 to 4, **characterized in that** said second sensor (25) is magnetic and detects the movable portion (28).

6. A simulated weapon according to any of the preceding claims, **characterized in that** the said control device (22) comprises a low-current branch powered by a battery (26), a high-current branch for connecting the actuator (6) to a battery (26) and a switch (27) for disconnecting the actuator (6) from the battery (26) on the basis of a signal generated from the low-current branch, said low-current branch comprising at least the second sensor (25).

7. A simulated weapon according to claim 6, **characterized in that** said low-current branch and said switch (27) can be connected between the battery (26) and the actuator (6) using electrical quick connectors (M1, F1, M2, F2).

8. A simulated weapon according to either claim 6 or 7, **characterized in that** the high-current branch comprises the first sensor (40) and **in that** the low-current branch comprises a trigger sensor (23), the trigger sensor (23) reacting before the first sensor (40) when a user pulls the trigger (8) so that the high-current branch is closed by the first sensor (40) when a user pulls the trigger (8).

9. A simulated weapon according to any claims from 6 to 8, **characterized in that** the second sensor (24; 25) is placed on one printed circuit board and said switch (27) is placed on a different printed circuit board.

10. A simulated weapon according to any of the preceding claims when depending from claim 3 and claim 6, **characterized by** comprising a selector (50) to bypass the control device (22) and in that said third sensor (24) is contactless so as to interrupt the low-current branch if a magazine is not arranged to close the third sensor (24) when said magazine is on board the weapon (1).

11. A simulated weapon according to any one of the preceding claims, **characterized in that** at least one of said first and second sensors (23, 24, 25) is a switch.

12. A simulated weapon according to any one of the preceding claims, **characterized in that** it comprises a virtual breech bolt (29) movable in an extracted position to simulate the condition of ejecting a round, and in a retracted position to simulate the condition of a round in the chamber, and **in that** said control device (22) comprises a blocking device (30) configured to block the virtual breech bolt (29) in the extracted position when the signal is detected that the magazine (7) is to be replaced.

13. A method for retrofitting a simulated weapon comprising a spring compressor (2) for generating a compressed air flow, a movable positioning device (3) for loading a pellet (4) in a shot chamber (5) which receives the compressed air generated by the spring compressor (2), an actuator (6) for controlling the spring compressor (2) and the positioning device (3), a magazine (7) for feeding the shot chamber (5) with pellets (4), a trigger (8) and a first sensor (23) for detecting a status of the trigger (8), the method comprising the step of mounting, on the weapon (1), at least one second sensor (24; 25) for detecting the connection of the magazine (7) so that the pellets (4) are fed in the shot chamber (5) or so that the magazine (7) is replaced, and an electric or electronic control device (22) configured to prevent the activation of the actuator (6) by means of the trigger (8) if the magazine (7) is not connected so as to feed the pellets (4) or if the magazine (7) is to be replaced.

14. A method according to claim 13, **characterized in that** the said simulated weapon comprises a high-current branch for connecting the actuator (6) to a battery (26) and comprises the step of mounting a low-current branch powered by a battery (26), and a switch (27) for disconnecting the actuator (6) from the battery (26) on the basis of a signal generated from the low-current branch, said low-current branch comprising at least the second sensor (25) and said switch (27) comprising a relay.

15. A method according to either claim 13 or 14, **characterized in that** the simulated weapon (1) comprises a virtual breech bolt (29) movable in an extracted position to simulate the condition of ejecting a round, and in a retracted position to simulate the condition of a round in the chamber, and **in that** it comprises the step of mounting a blocking device (30) on the weapon configured to block the virtual breech bolt (29) in the extracted position when the signal is detected that the magazine (7) is to be replaced.

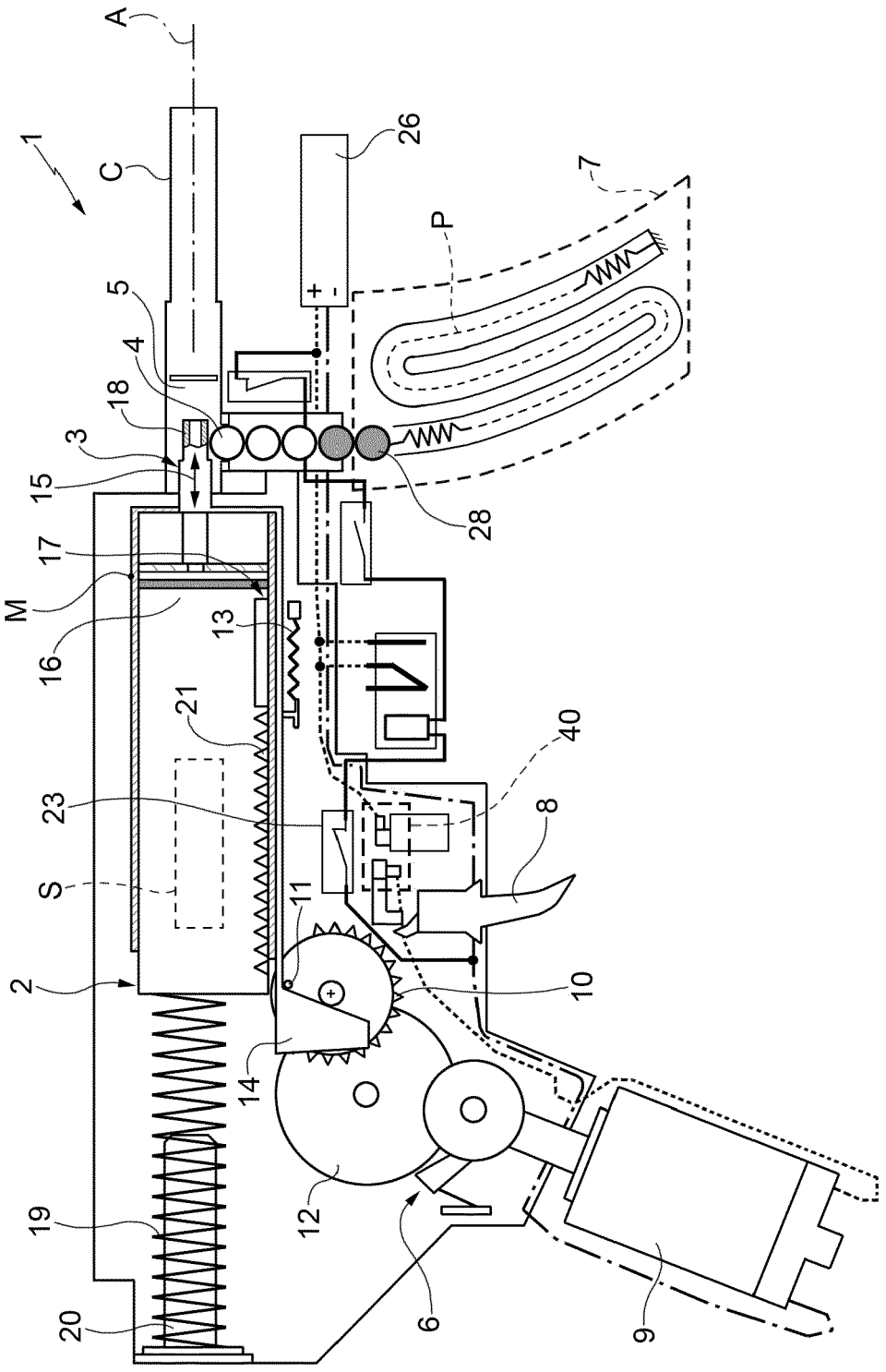

FIG. 1

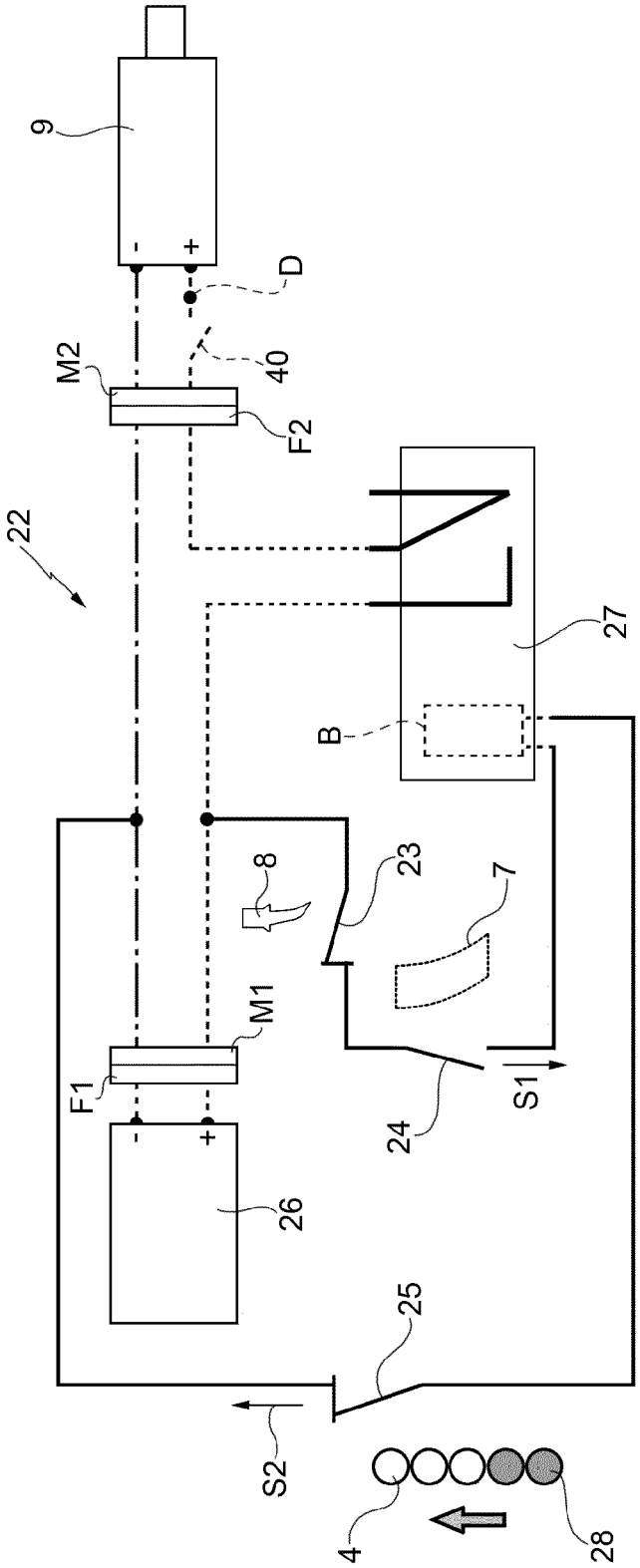

FIG. 2

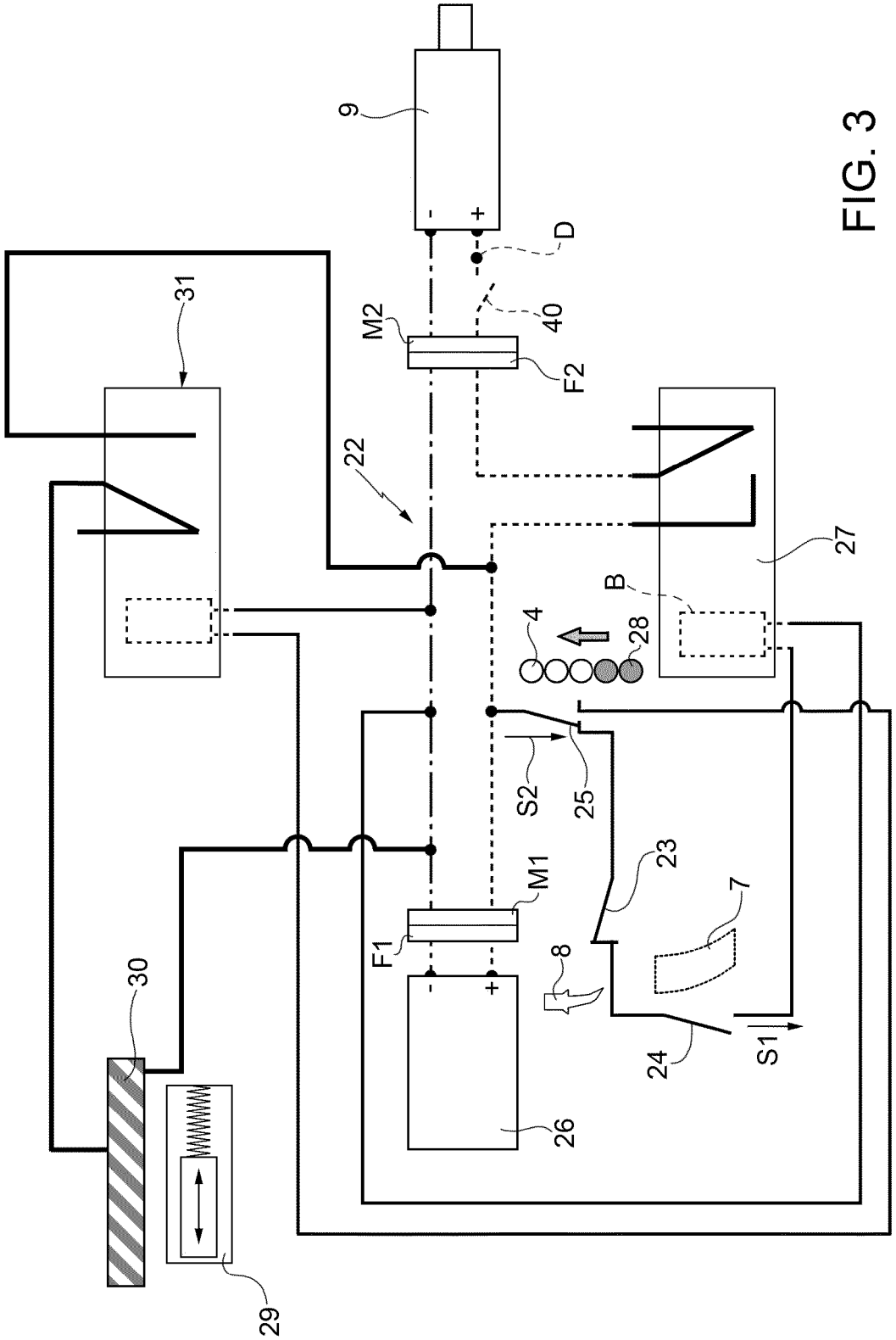

FIG. 3

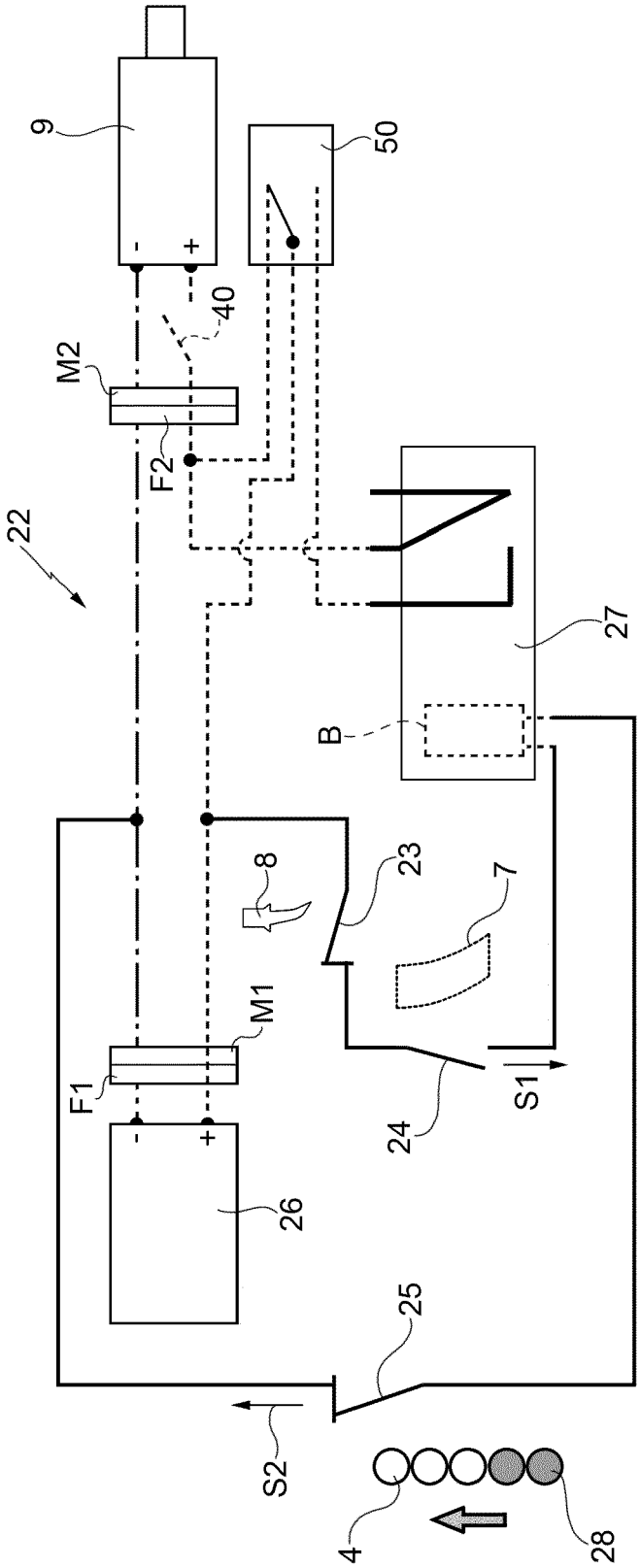

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 14 18 8379

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	BG 110 343 A (PEEV VLADIMIR [BG]; BINEV STANIMIR [BG]) 31 July 2009 (2009-07-31) * page 4, paragraph 2 - page 13, paragraph 4; figures 1-4 * -----	1,2,4,6, 7,9, 11-15	INV. F41B11/71 F41B11/57 ADD. F41A17/36
X Y	US 2007/000483 A1 (TSURUMOTO KOICHI [JP]) 4 January 2007 (2007-01-04) * paragraphs [0049] - [0182]; figures 1-23 * -----	1,6,7,9, 11,13,14 12,15	F41B11/642
Y	US 2009/253103 A1 (HOGAN JR RICHARD RUSSELL [US]) 8 October 2009 (2009-10-08) * paragraphs [0009] - [0065]; figures 1-4 * -----	12,15	
X	HK 1 167 229 A2 (GUAY GUAY TRADING CO LTD) 23 November 2012 (2012-11-23) * page 2 - page 12; figures 1-5 *	1,6,11, 13,14	
X,P	& EP 2 698 594 A1 (GUAY GUAY TRADING CO LTD [TW]) 19 February 2014 (2014-02-19) * paragraphs [0001] - [0018]; figures 1-5 * -----	1,6,11, 13	

TECHNICAL FIELDS SEARCHED (IPC)
F41B
F41A

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 February 2015	Kasten, Klaus

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 18 8379

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18-02-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
BG 110343 A	31-07-2009		
US 2007000483 A1	04-01-2007	AU 2003292713 A1	12-08-2005
		US 2007000483 A1	04-01-2007
		WO 2005066574 A1	21-07-2005
US 2009253103 A1	08-10-2009	US 2009253103 A1	08-10-2009
		WO 2010014126 A2	04-02-2010
HK 1167229 A2	23-11-2012	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2007000483 A1 **[0005]**
- EP 2698594 A **[0006]**