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(54) Mechanism for loading and feeding a semi-automatic rifle and its operating method

(57) A mechanism for loading and feeding cartridges (12) in a semi-automatic rifle comprises a breechblock carrier (14), slidably guided in a housing (11) of the rifle, a breechblock (15) slidably supported by said breechblock carrier (14), a lifter (35) intended for lifting one of the cartridges (12) from the level of a tank tube (33) to the level of the chamber (23) of the rifle, a breechblock stopping tooth (37) suitable for locking the breechblock carrier (14) and the breechblock (15) in open position, a lifter stopping tooth (36), suitable for unlocking the lifter so as to allow the breechblock (15) and the breechblock carrier (14) to be unlocked so as to allow its manual opening manoeuvre so that the breechblock carrier (14) stays open without the need for the user to keep it so allowing easy replacement, loading or manual elimination of one or more cartridges.

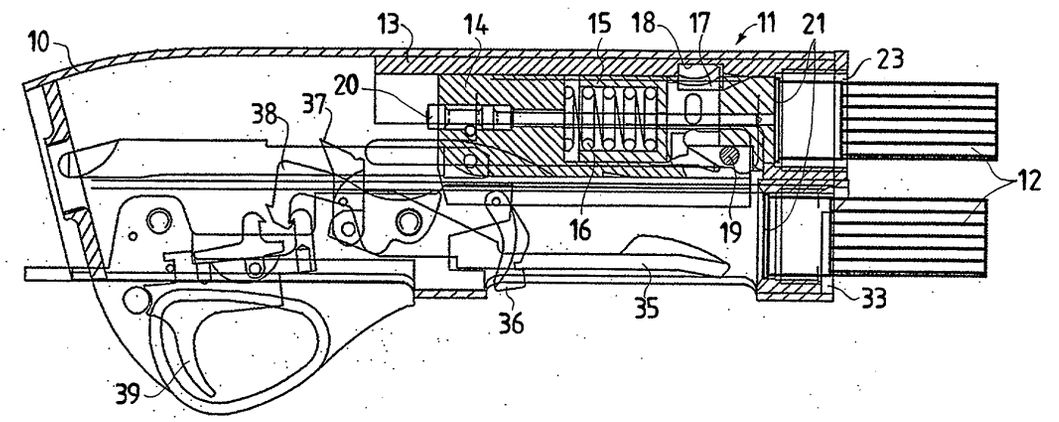

Fig.1

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Description

[0001] The present invention concerns a mechanism for loading and feeding a semi-automatic rifle and its operating method.

[0002] In particular, the invention concerns a mechanism for loading and feeding the cartridge in the chamber of an inertia operation semi-automatic hunting rifle with shot cartridges.

[0003] For some time inertia operation rifles have been known, in which the kinetic energy of the breechblock group is exploited, sliding open backwards following the blasting of the cartridge, to obtain the expulsion of the cartridge case and the loading of the next cartridge in the chamber.

[0004] In feeding and loading systems currently existing, the breechblock remains in open position only thanks to the presence of levers or buttons which, on the one hand make the rifle more complex as well as expensive, but on the other hand make the replacement of the cartridge impractical.

[0005] In other known systems, the breechblock remains open only if held with the hand which simultaneously supports the weight of the rifle, whereas with the other hand the changing of the cartridge is carried out.

[0006] In yet other systems, by pulling the cocking clip the breechblock is taken to the switch limit unlocking a cartridge from the tank tube and taking it into the chamber preventing the replacement and insertion of an outer cartridge taken from the cartridge belt.

[0007] The purpose of the present invention is that of providing a mechanism for loading and feeding a semi-automatic rifle which allows the aforementioned drawbacks to be avoided providing a simple and safe system which allows the loading and replacement of the cartridge from the chamber in any easy and quick manner, an operation which is, moreover, frequent in the case of a tank which fires just three shots.

[0008] Indeed, it should be remembered that, according to the current hunting regulations, the use of a maximum of three cartridges is permitted of which one is in the chamber and two are in the tank.

[0009] This purpose according to the present invention is accomplished by realising a loading and feeding mechanism according to that which is outlined in claim 1.

[0010] Further characteristics of the invention form the object of claims 2 to 7.

[0011] An operating method of the mechanism according to the invention forms the object of claim 8 and thereafter.

[0012] The mechanism for loading and feeding a semi-automatic rifle according to the invention comprises a lifter and a lifting stop tooth suitable for unlocking the lifter and taking the breechblock group to the switch limit, allows the breechblock carrier to always be kept open, both with cartridges in the tank and in the absence of cartridges, without the need to hold it by hand and without the help of specific levers or buttons intended for the purpose, in this way allowing easy loading and fast replacement of the cartridge in the chamber.

[0013] The characteristics and advantages of the mechanism for loading and feeding a semi-automatic rifle and its operating method according to the present invention shall become clearer from the following description, given as an example and not for limiting purposes, referring to the attached schematic drawings, in which:

figures 1 to 5, 7, 9, 11, 12, 13, 15, 17, 21, 22, 24, 26, 28, 30, 31, 32, 35 illustrate in a side section view a detail of the rifle carrying the mechanism according to the invention during various operating steps;
figure 6 is a view from below of the detail of figure 5;
figure 8 is a view from below of the detail of figure 7;
figure 10 is a view from below of the detail of figure 9;
figure 14 is a view from below of the detail of figure 13;
figure 16 is a view from below of the detail of figure 15;
figure 18 is a view from below of the detail of figure 17;
figures 19, 20, 33, 34 are views from below of the detail of a rifle during various operating steps;
figure 23 is a view from below of the detail of figure 22;
figure 25 is a view from below of the detail of figure 24;
figure 27 is a view from below of the detail of figure 26;
figure 29 is a view from below of the detail of figure 28;
figure 36 is a view from below of the detail of figure 35.

[0014] With reference to the figures, a casing 10 of a semi-automatic hunting rifle houses, inside of its housing 11, the sear, loading and feed mechanisms for the firing of shot cartridges 12.

[0015] In particular, inside a breech 13, consisting of the extension of the barrel of the rifle in the housing 11, a breechblock carrier 14 slides carrying, arranged inside of it, the breechblock 15.

[0016] Between the breechblock 15 and the breechblock carrier 14 an inertia spring 16 is placed the function of which is that of compressing during the backwards motion, or recoil, of the breechblock 15 following firing to then restore its elastic energy, until a certain compression threshold is exceeded, trusting the breechblock carrier 14 which possesses a relatively large mass.

[0017] The breechblock carrier 14 in backwards motion recoils and frees the latch 17 protruding from the breechblock 15.

[0018] Said latch 17, during the whole of the firing step

is engaged in a seat 18 realised in the breech 13 so as to lock making the breech 13 and the breechblock 15 integral.

[0019] The latch 17 engages at the bottom with a cocking clip 19 consisting of a pin which crosses the breechblock 15, to allow its unlocking once a shot is fired.

[0020] A firing pin 20 is arranged along the longitudinal axis of the breechblock carrier 14 and of the breechblock in a central position to strike the centre of the base plate 21 of the cartridge 12, when it is inserted in the chamber 23 of the rifle.

[0021] At the centre of the base plate 21 of the cartridge, indeed, the capsule is arranged which, struck by the firing pin 20, starts of the blast.

[0022] The feeding and loading mechanism comprises a cartridge stopping lever 30 arranged on one side of the housing and having an actuation dowel 31, which acts as a hinge being pivoted along the side of the housing, and a return spring 32 which takes the lever back into rest position.

[0023] With one of its two ends 30' the lever 30 makes contact with the base plate of the cartridge 12 present at the inlet of a tank tube 33 intended for housing the cartridges and arranged below the chamber.

[0024] The feeding and loading mechanism also comprises a lifter 35 or spoon, intended to lift a cartridge 12 from the level of the tank tube 33 to the level of the overlying chamber 23 for loading.

[0025] The lifter 35 is locked in lowered position until a new cartridge 12 arrives, through engagement of a stop tooth 36 of the lifter arranged near to the rear portion of the lifter 35 with respect to the inlet end of the cartridge 12.

[0026] After firing, the breechblock carrier 14 recoils and continues its stroke until the cartridge case is ejected, after which it either remains open held by a breechblock stop tooth 37, or it returns into locking position putting another cartridge in the chamber.

[0027] Conventionally, in the housing there is the sear mechanism comprising a hammer 38, ratchets and pivoting pins suitable, respectively, for holding the mechanisms and for allowing the rotation thereof, and a trigger 39 through which the user can act to fire.

[0028] For a better understanding of the purposes and advantages of the invention it is suitable to make a reference to the various possible ways of operating the rifle and the various operations to be carried out in each way of operating.

- Manual replacement and loading of the cartridge from the tank tube to the chamber.

  With reference to figures 1 to 12, in the present case the rifle has the breechblock 15 closed and has a cartridge 12 in the chamber 23 which. must be replaced with another cartridge 12 present inside the tank tube 33, and for such a purpose the following operations are carried out:

  a) pull the cocking clip 19 and take the breechblock carrier 14 to the switch limit, the cartridge which was in the chamber is ejected, whereas the breechblock carrier 14 remains open since it is held by the breechblock stop tooth 37;
  b) press, preferably with the thumb, the base plate 21 of the cartridge 12 which is inside the tank tube 33 to take the new cartridge from the tank tube 33 to the chamber 23, then the cartridge stopping lever 30, thanks to its return spring 32, returns into rest position, unlocking the cartridge 12 and allowing it to come out from the tank tube 33.

  The cartridge, coming out from the tank tube 33, stops its stroke against the stop tooth 36 of the lifter 35, unlocking the lifter itself. The lifter 35 at this point rises taking the cartridge into position for loading and freeing the breechblock carrier 14 from the grip of the stop tooth 37, the breechblock carrier advances and thrusts the cartridge until it is inside the chamber ready for firing.

  The operations described in a) and b) can also be reversed, i.e. it is possible to first make the new cartridge come out from the tank tube, taking it on the lifter to below the carrier, then to eject the cartridge which was in the chamber by pulling the clip.

  In such a case the carrier is not held by the breechblock stop tooth, since the lifter is already free to rise and the new cartridge is put in the chamber automatically.

- Manual replacement and loading of the cartridge directly to the chamber (figures 1 to 6, 13, 14, 11, 12 and once again 1).

  In this case the tank tube is empty, or else the cartridges present in it are not intended to be used. The rifle has the cartridge in the chamber which must be replaced with another cartridge taken from the cartridge belt and inserted manually, and for such a purpose the following operations are carried out:

  c) pull the cocking clip 19, take the breechblock carrier 14 to the limit switch, the cartridge which was in the chamber is ejected, whereas the breechblock carrier 14 remains open since it is held by the breechblock stop tooth 37;
  d) insert the new cartridge, taken from the cartridge belt or from a pocket, in the rifle above the lifter 35 through an opening present on the casing;
  e) press, with the hand, the stop tooth 36 of the lifter 35 unlocking it, the lifter 35 at this point rises taking the cartridge into position for loading and freeing the breechblock carrier 14 from the grip of the stop tooth 37, the breechblock

group advances, thrusted by its return spring and thrusts the cartridge until it is inside the chamber ready for firing.

- Manual loading of the cartridges in the tank tube (figures 15 to 23), the cartridge stopping lever 30 is in rest position and stays in such a position thanks to its return spring 32, the tank tube 33 is empty, and for such a purpose the following operations are carried out:

  f) press the stop tooth 36 of the lifter 35, unlocking it;
  g) lift the lifter so as to allow access to the inlet of the tank tube 33, the lifter 35, rising, interferes with the tilted plane present in the rear part of the cartridge stopping lever 30 allowing it to slightly rotate and to displace its end 30' inside the access zone of the cartridge in the tank tube 33, the lever 30 remains in such a position until the lifter 35 is raised;
  h) introduce the cartridge into the tank tube 33 preferably with a thumb, such an operation determines a flexing of the end 30' of the cartridge stopping lever 30 until the cartridge is completely inside the tube, by releasing the thumb, the cartridge is held inside the tank tube 33 by the end 30' of the cartridge stopping lever 30 which in the meantime has recovered its flexing and upon which now presses the base plate of the inserted cartridge;
  i1) repeat step h) for the introduction of the other cartridges; alternatively:
  i2) release the lifter 35 which, pulled back by the spring of the breechblock stopping tooth 37, returns into its rest position, the cartridge stopping lever 30, with one or more cartridges in the tank tube 33 which press against its end 30', maintains the assumed position and does not manage to go back into its rest position, in this way allowing the holding of the cartridges in the tube itself.

  In the case in which the tank tube 33 is not empty, the lifter shall already be in the position described in g).

- Automatic loading of the cartridge from the tank tube to the chamber, during the firing step, see figures 24 to 30 and once again figures 12 and 1.

  Before the shot begins, the lifter 35 is in rest position, locked by its stop tooth 36, whereas the cartridge stopping lever 30, since there are one or more cartridges in the tank tube 33 which press against its end 30', maintains the assumed position and does not manage to return into its rest position, in this way allowing the holding of the cartridges in the tube itself, and for such a purpose the following operations are carried out:

  l) press the trigger 39, at the start of the shot the recoil of the firearm ensures that the cartridges present in the tank tube 33 maintain their position whereas the whole of the firearm recoils backwards including the cartridge stopping lever 30 which is integral with it, the cartridge stopping lever 30, no longer held by the base plate of the cartridge in the tank, and since the lifter 35 is lowered, it no longer has obstructions and can return to take up its rest position. In this situation, the end 30' of the cartridge stopping lever 30 no longer obstructs the escape of the cartridge from the tank tube 33 which therefore comes out freely stopping against the stop tooth of the lifter 36. During its stroke the cartridge 12 meets the tilted plane of the rear part of the cartridge stopping lever 30, thus making the lever itself rotate which, with its end 30' returns to reset the locking condition stopping the next cartridge inside the tank tube 33.

  The cartridge which has come out from the tank tube 33 stops its stroke against the stop tooth 36 of the lifter 35, unlocking the lifter itself which rises to take the cartridge into position for going into the chamber, the breechblock carrier 14 which after firing is set back and has ejected the spent cartridge case, not being held by its stop tooth 37, once again advances, thrusted by its return spring, thus putting the new cartridge in the chamber ready for the next shot.

- Direct elimination of all of the cartridges from the tank tube (figures 31 to 36), for such a purpose the following operations are carried out:

  m) press the stop tooth 36 of the lifter 35, unlocking it and lift the lifter so as to allow access to the mouth of the tank tube 33;
  n) press, preferably with a thumb, the base plate of the cartridge present inside the tank tube 33 and cause a slight flexing on the end 30' of the cartridge stopping lever 30, the cartridge at this point comes out from tank tube 33, whereas the next one is held in the tube by the end 30' of the cartridge stopping lever 30 which in the meantime has recovered the flexing and upon which the base plate of the next cartridge now presses;
  o) repeat the operation described in n) to eliminate further cartridges 12.

Claims

1. Mechanism for loading and feeding cartridges (12) in a semi-automatic rifle comprising:

- a breechblock carrier (14), slidably guided in a housing (11) of the rifle;
- a breechblock (15) slidably supported by said breechblock carrier (14);
- a lifter (35) intended for lifting one of the cartridges (12) from the level of a tank tube (33) suitable for housing the reserve cartridges to the level of the chamber (23) of the rifle;
- a breechblock stopping tooth (37) suitable for locking the breechblock carrier (14) and the breechblock (15) in open position, **characterised in that** it comprises a lifter stopping tooth (36) hinged in said housing (11) near to the rear portion of the lifter (35) with respect to the inlet end of the cartridge (12) and suitable for unlocking the breechblock (15) and the breechblock carrier (14) so as to allow its manual opening manoeuvre so that once the opening switch limit has been reached, the breechblock carrier (14) stays open without the need for the user to keep it so allowing easy replacement, loading or manual elimination of one or more cartridges.

2. Mechanism according to claim 1, **characterised in that** said lifter stopping tooth (36) is realised so as to ensure that by unlocking the lifter (35) allows it to be lifted to take the cartridge (12) into position for going into the chamber and freeing the breechblock carrier (14) from the engagement of the breechblock stopping tooth (37).

3. Mechanism according to claim 2, **characterised in that** said lifter stopping tooth (36) is arranged so as to be unlocked from contact with the base plate (21) of the cartridge (12) when it is arranged on the lifter (35) to allow it to be lifted.

4. Mechanism according to claim 3, **characterised in that** it also comprises a cartridge stopping lever (30) for holding said cartridges (12) inside said tank tube (33) through pressing of an end (30') thereof against the base plate (21) of the cartridge (12).

5. Mechanism according to claim 4, **characterised in that** said lever (30) is arranged along a side of the housing and is equipped with a dowel (31) for its actuation and a return spring (32) to take the lever back to its rest position in which the end (30') does not hold the cartridge (12) in the tank tube (33).

6. Mechanism according to claim 3, **characterised in that** it also comprises a cocking clip (19) realised in the form of a pin crossing the lower portion of the housing (11) suitable for freeing the breechblock carrier (14).

7. Method for loading and feeding the semi-automatic rifle with cartridges according to claims 1 to 6, **characterised in that** it comprises, for the manual replacement and loading of the cartridge from the tank tube to the chamber, the following operating steps:

a) pull the cocking clip (19) and take the breechblock carrier (14) to the switch limit to eject the cartridge (12) which was in the chamber making the breechblock stop tooth (37) hold the breechblock (15);
b) press, with a finger, the base plate (21) of the cartridge (12) arranged in the tank tube (33) so as to unlock the lever (30) and to free the cartridge (12) allowing it to come out from the tank tube (33), so that said cartridge coming out from the tank tube (33) stops its stroke against the stop tooth (36) of the lifter (35) unlocking the lifter itself, the lifter (35) rising taking the cartridge into position for being put into the chamber and freeing the breechblock carrier (14) from the grip of the stop tooth (37), the breechblock carrier advances and thrusts the cartridge until it is in the chamber for firing.

8. Method for loading and feeding the semi-automatic rifle with cartridges according to claims 1 to 6, **characterised in that** it comprises, for the manual replacement and loading of the cartridge directly into the chamber, the following operating steps:

c) pull the cocking clip (19) and take the breechblock carrier (14) to the limit switch, the cartridge which was in the chamber is ejected, whereas the breechblock carrier (14) remains open since it is held by the breechblock stop tooth (37);
d) insert the new cartridge, taken from the cartridge belt or from a pocket, in the rifle above the lifter (35) ;
e) press, with the hand, the stop tooth (36) of the lifter (35) unlocking it, the lifter (35) rising takes the cartridge into position for being put into the chamber and freeing the breechblock carrier (14) from the grip of the breechblock stop tooth (37), allows breechblock to advance with the consequent placing of the cartridge in the chamber ready for firing.

9. Method for loading and feeding the semi-automatic rifle with cartridges according to claims 1 to 6, **characterised in that** it comprises, for the manual loading of the cartridges in the tank tube, the following operating steps:

f) press the stop tooth (36) of the lifter (35), unlocking it;
g) lift the lifter so as to allow access to the inlet of the tank tube (33), the lifter (35), rising, inter-

feres with the tilted plane present in the rear part of the cartridge stopping lever (30) allowing it to slightly rotate and to displace its end (30') inside the access zone of the cartridge in the tank tube (33), the lever (30) remains in such a position until the lifter (35) is raised;
h) introduce the cartridge into the tank tube (33) preferably with a thumb, such an operation determining a flexing of the end (30') of the cartridge stopping lever (30) until the cartridge is completely inside the tube, by releasing the thumb, the cartridge being held inside the tank tube (33) by the end (30') of the cartridge stopping lever (30) which has recovered its flexing and upon which now presses the base plate of the inserted cartridge;

10. Method for loading and feeding the semi-automatic rifle with cartridges according to claim 9, **characterised in that** it also comprises the following operating step:

i1) repeat step h) for the introduction of other cartridges (12).

11. Method for loading and feeding the semi-automatic rifle with cartridges according to claim 9, **characterised in that** it also comprises the following operating step:

i2) release the lifter (35) which, pulled back by the spring of the breechblock stopping tooth (37), returns to its rest position.

12. Method for loading and feeding the semi-automatic rifle with cartridges according to claims 1 to 6, **characterised in that** it comprises, for the automatic loading of the cartridge from the tank tube to the chamber, the following operating steps:

l) press the trigger (39), at the start of the shot, the recoil of the firearm ensures that the cartridges present in the tank tube (33) maintain their position whereas the whole of the firearm recoils backwards including the cartridge stopping lever (30) which is integral with it, the cartridge stopping lever (30), no longer held by the base plate of the cartridge in the tank, and since the lifter (35) is lowered, it no longer has obstructions and can return to take up its rest position, the end (30') of the cartridge stopping lever (30) no longer obstructing the escape of the cartridge from the tank tube (33) allows it to come out freely and stopping against the stop tooth (36) of the lifter (35), during its stroke the cartridge (12) meets the tilted plane of the rear part of the cartridge stopping lever (30), thus making the lever itself rotate which, with its end (30') returns to reset the locking condition stopping the next cartridge inside the tank tube (33), the cartridge which has come out from the tank tube (33) stops its stroke against the stop tooth (36) of the lifter (35), unlocking the lifter itself which rises to take the cartridge into position for being put into the chamber, the breechblock carrier (14) not being held by its stop tooth (37) goes back to advance, putting the new cartridge into the chamber.

13. Method for loading and feeding the semi-automatic rifle with cartridges according to claims 1 to 6, **characterised in that** it comprises, for the direct elimination of all of the cartridges from the tank tube, the following operating steps:

m) press the stop tooth (36) of the lifter (35), unlocking it and lift the lifter so as to allow access to the mouth of the tank tube (33);
n) press, with a finger, the base plate of the cartridge present inside the tank tube (33) and cause a slight flexing on the end (30') of the cartridge stopping lever (30), the cartridge point coming out from tank tube (33), the next one being held in the tube by the end (30') of the cartridge stopping lever (30);
o) repeat the operation described in n) to eliminate further cartridges (12).

Fig.1

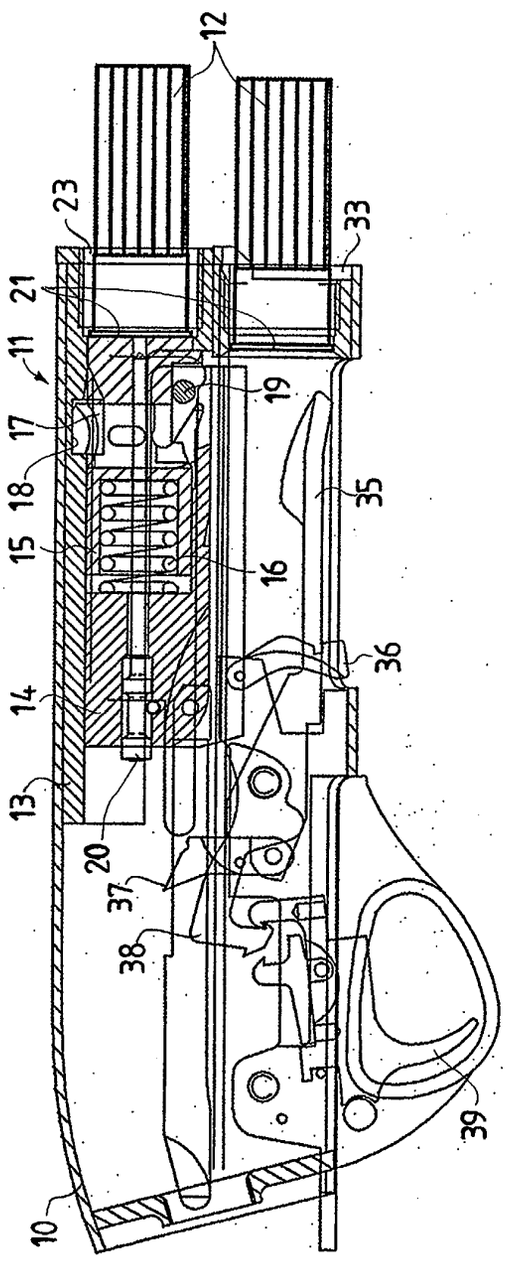
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Fig.2

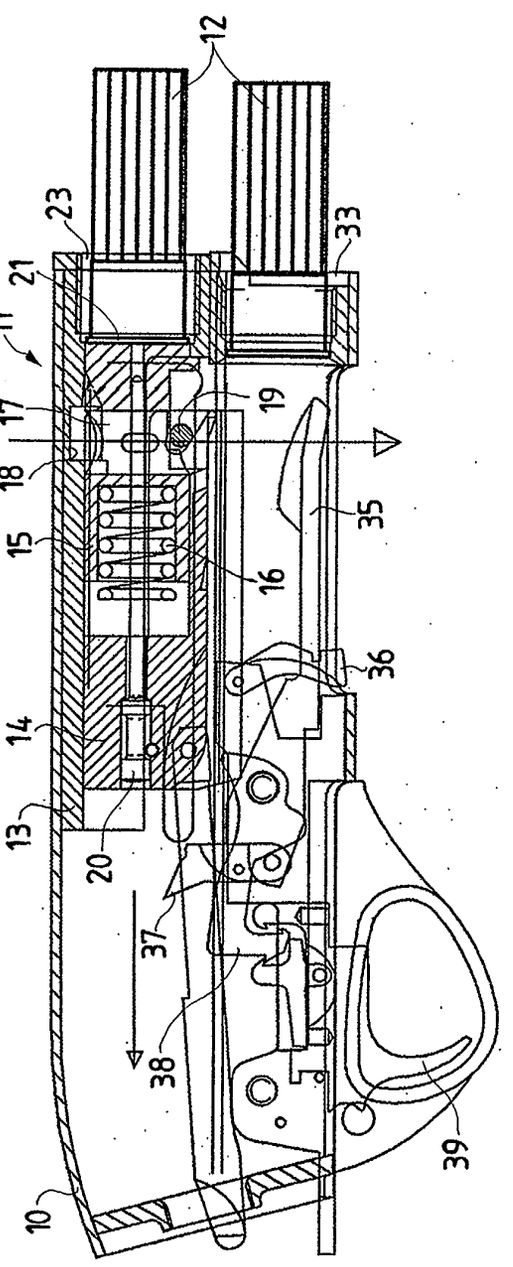
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Fig.3

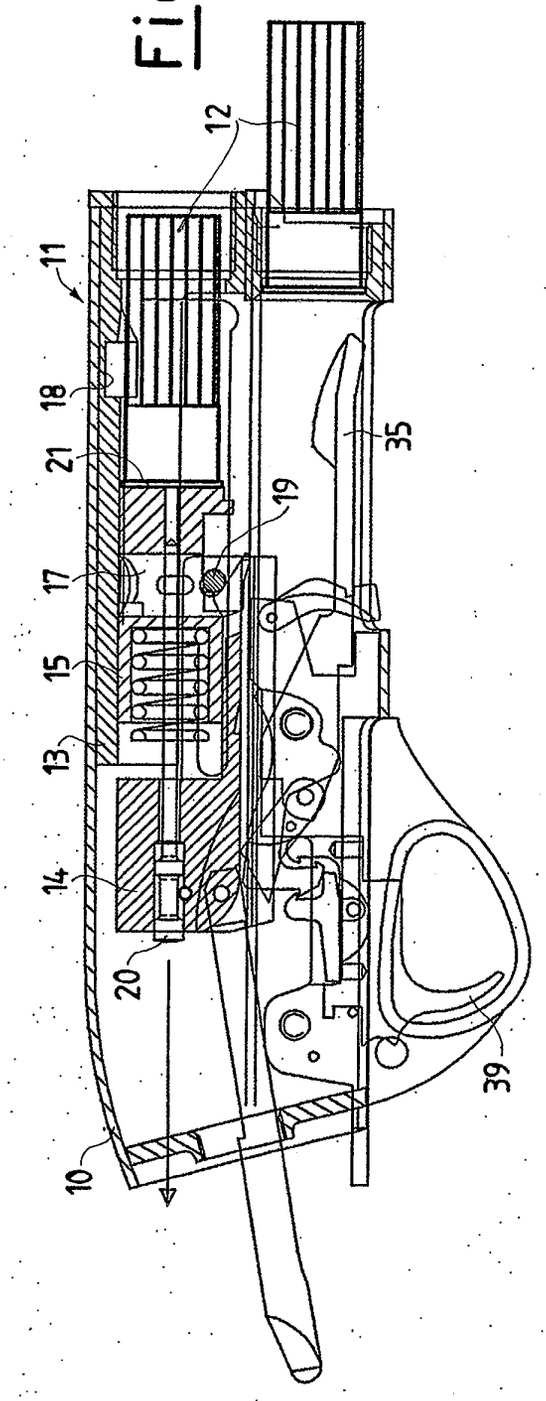
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Fig.4

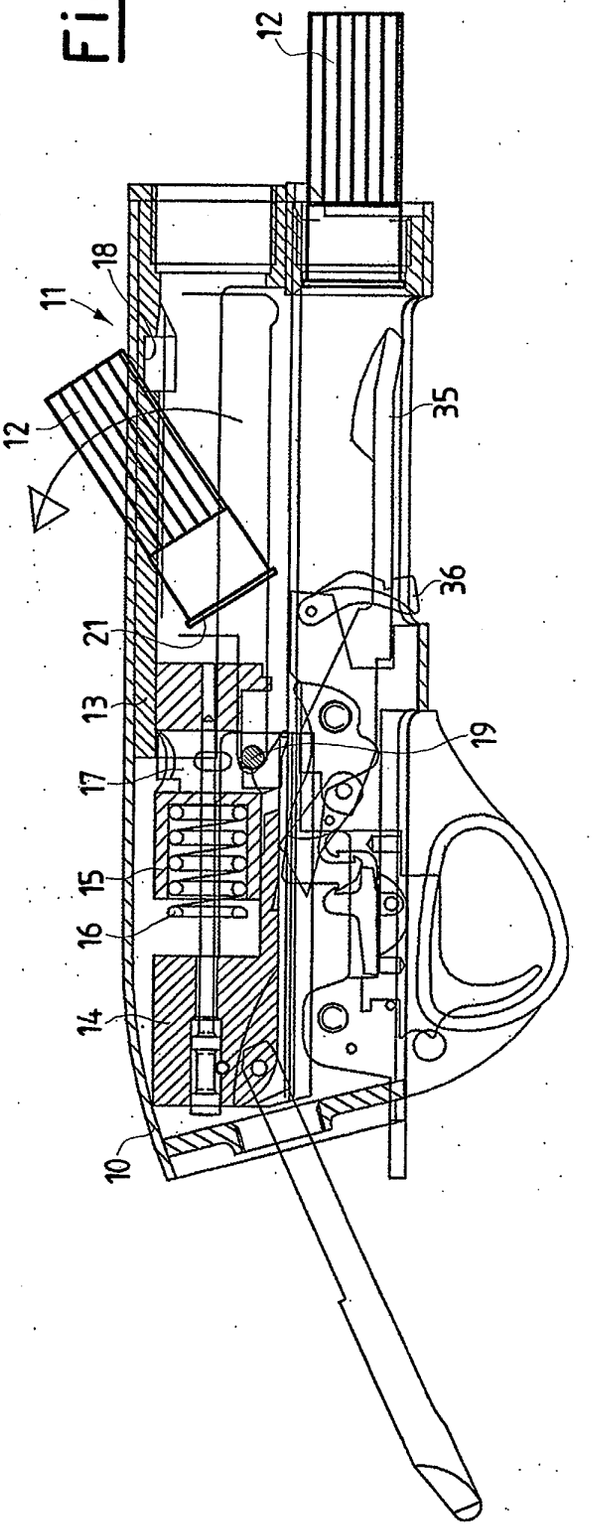
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Fig.5

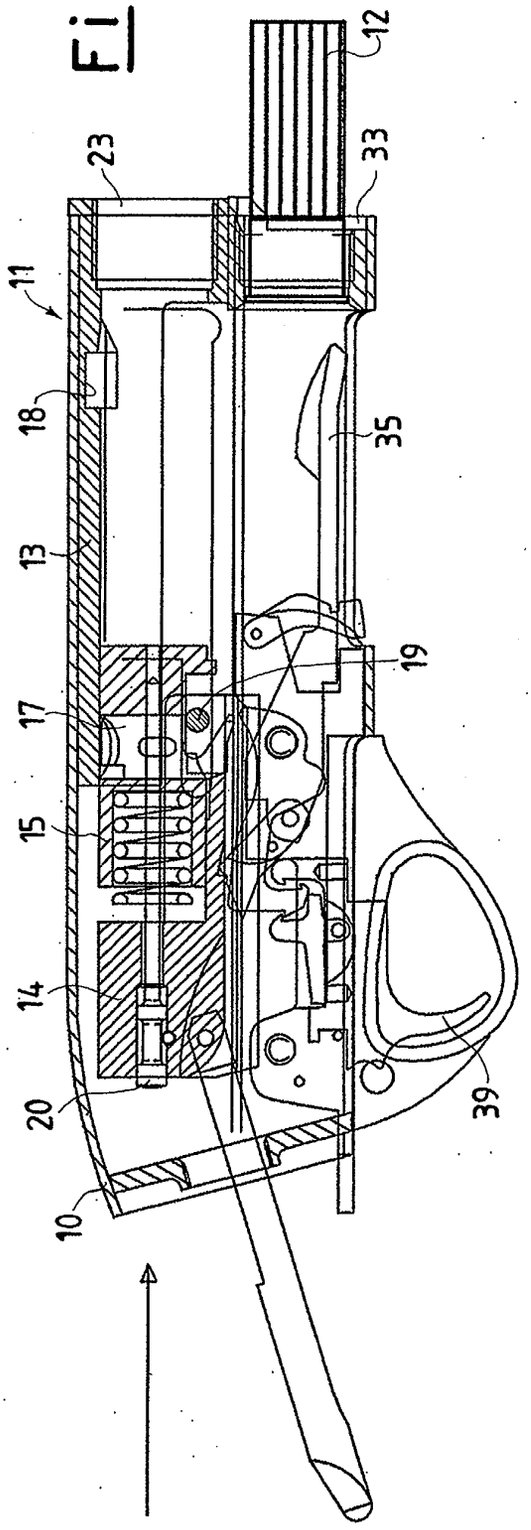


Fig.6

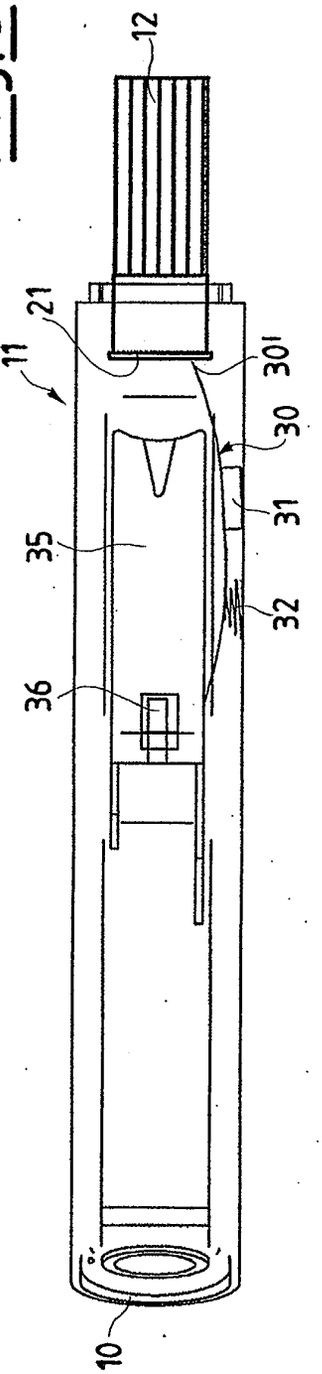


Fig.7

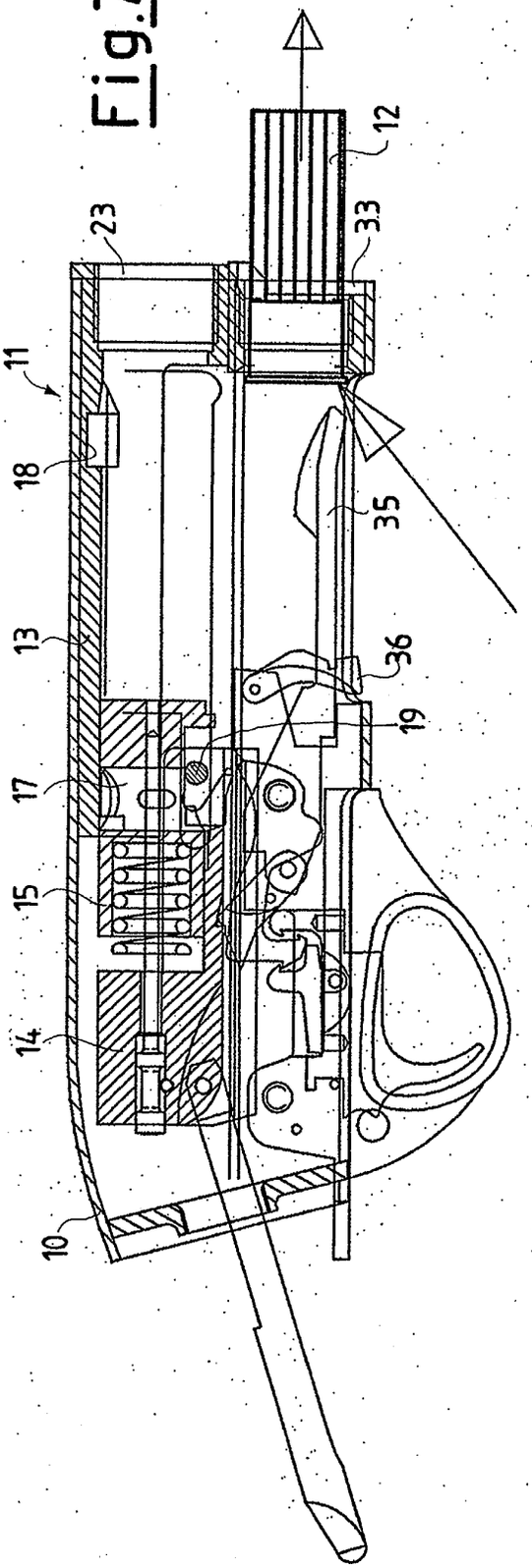


Fig.8

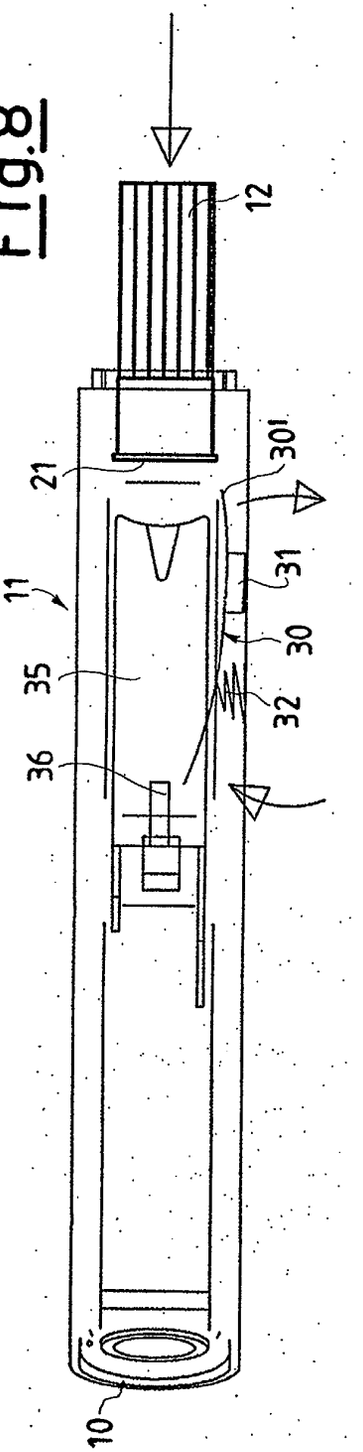


Fig.9

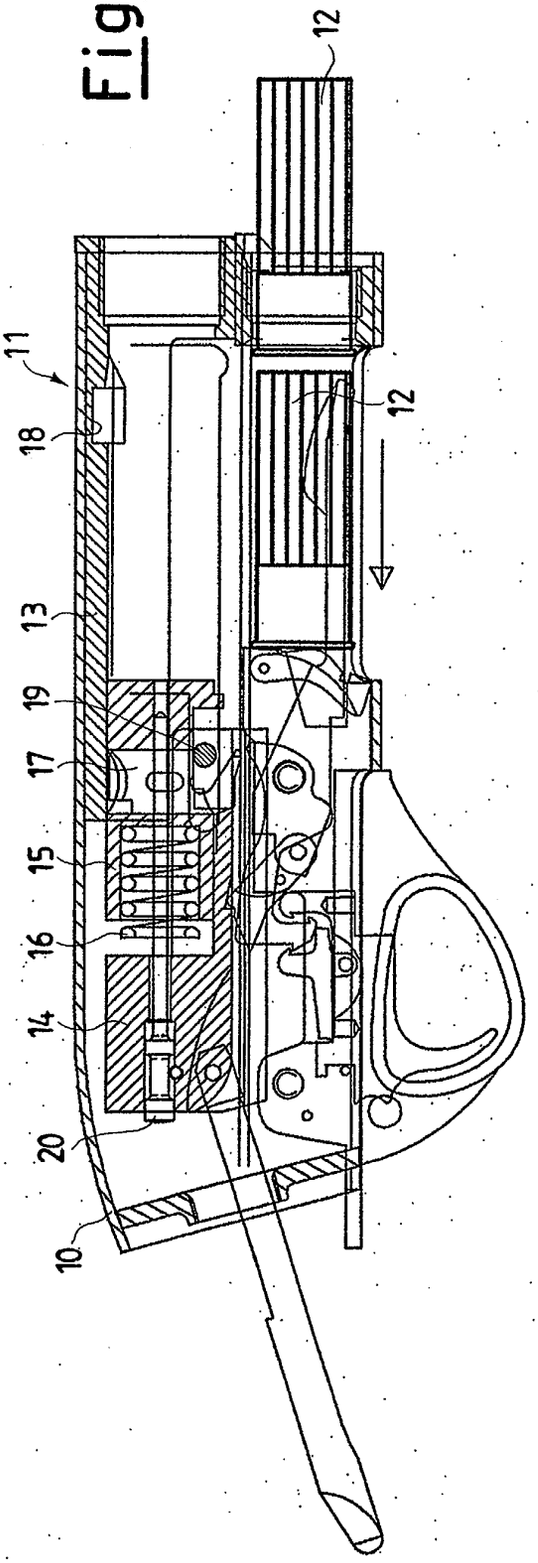


Fig.10

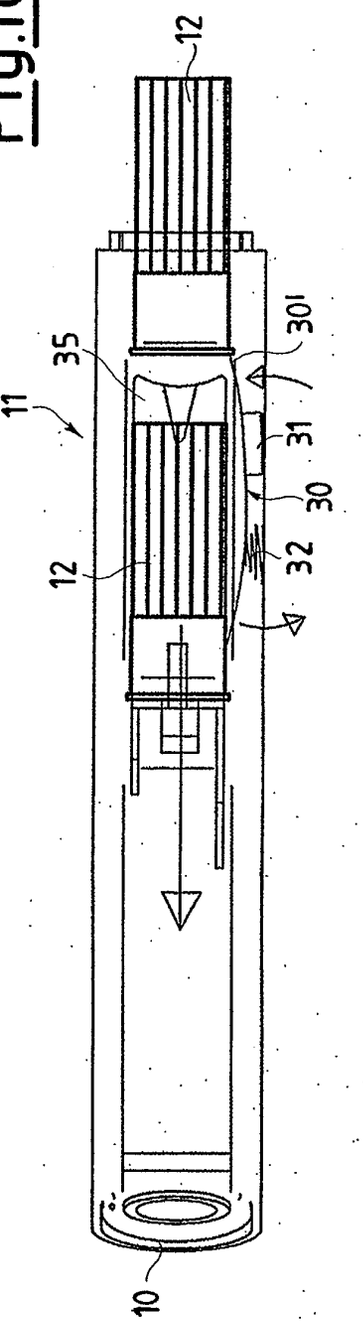


Fig.11

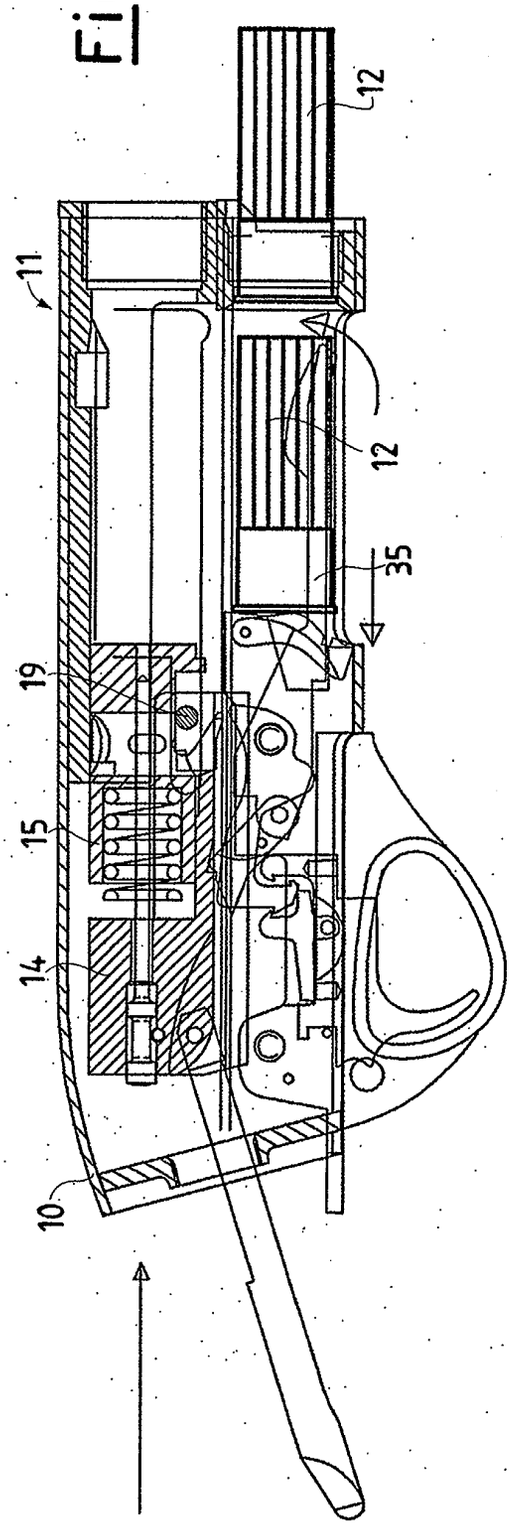


Fig.12

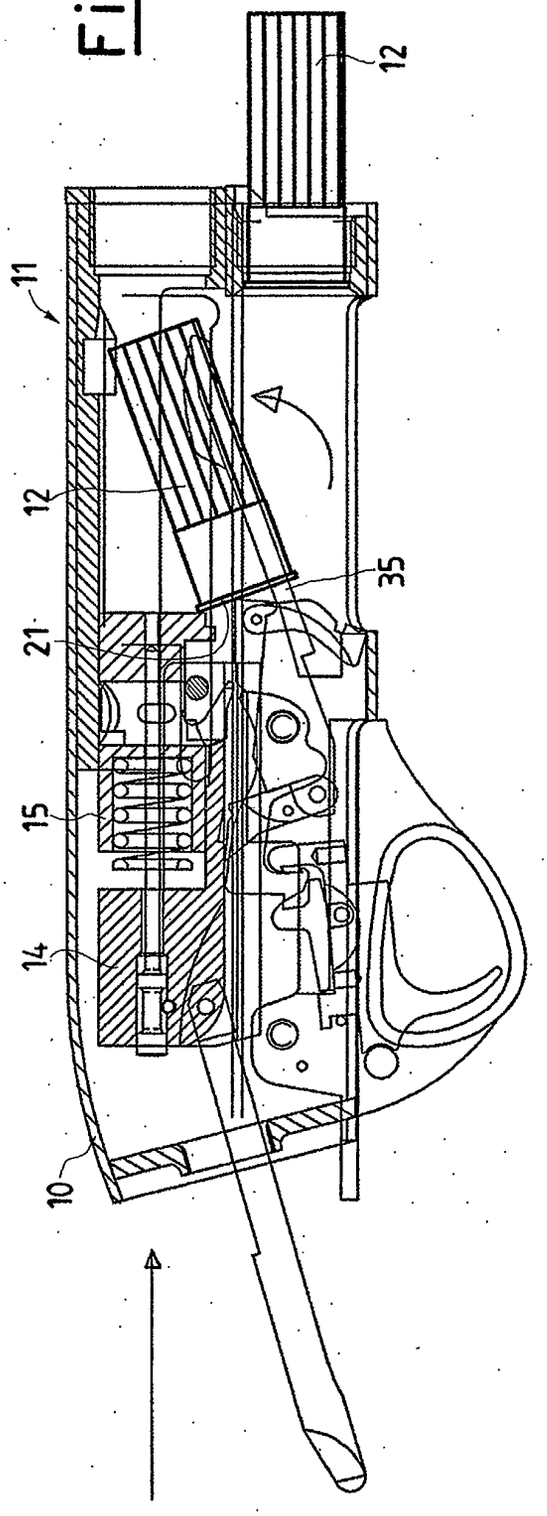


Fig.13

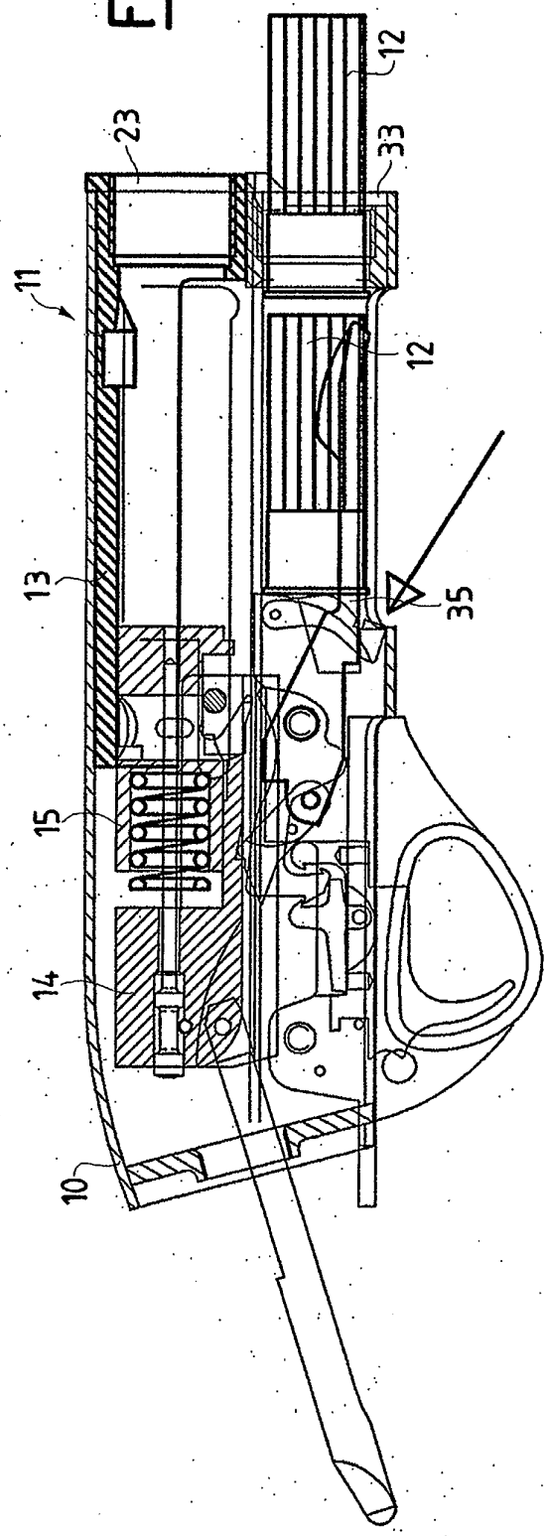
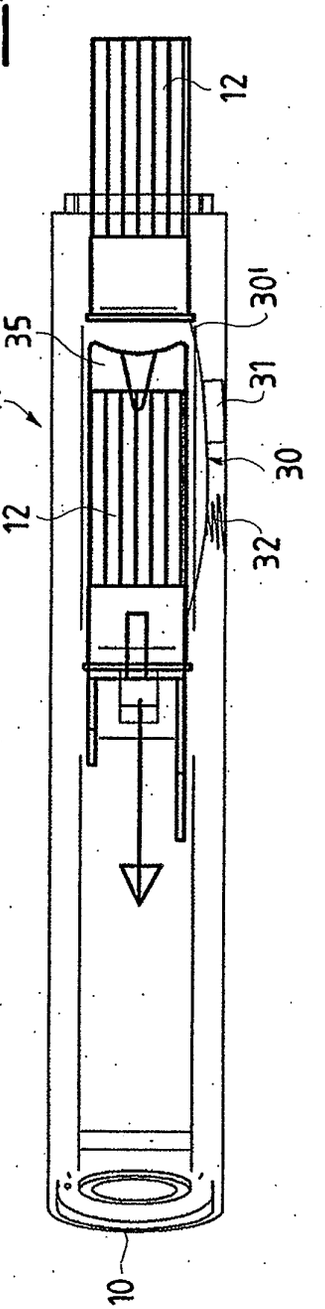


Fig.14



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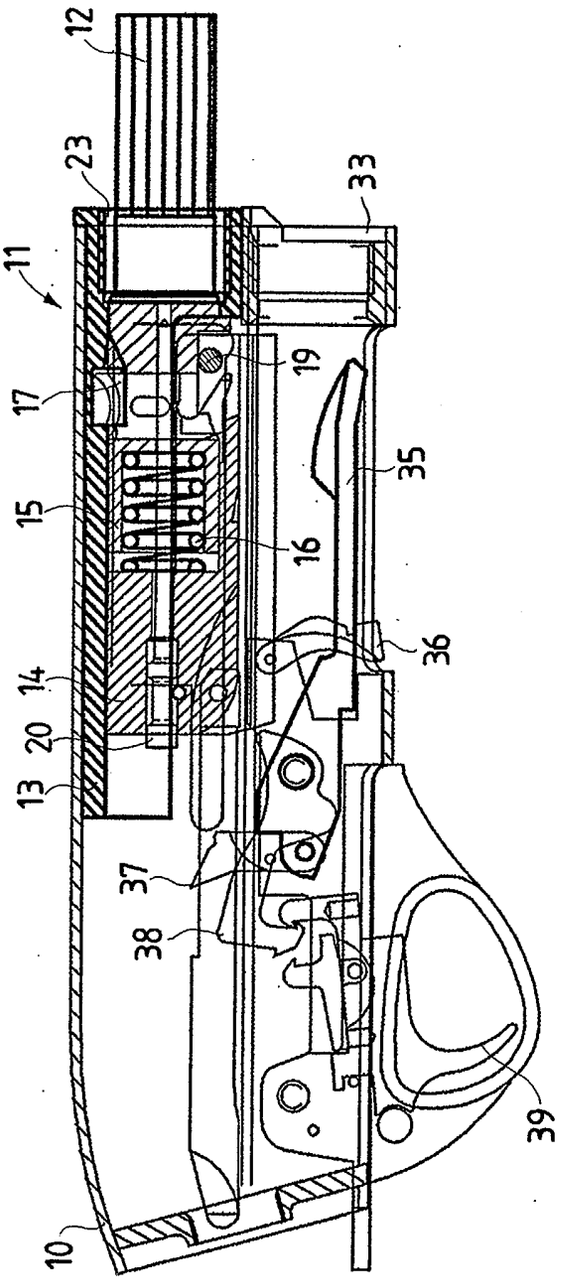
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Fig.16

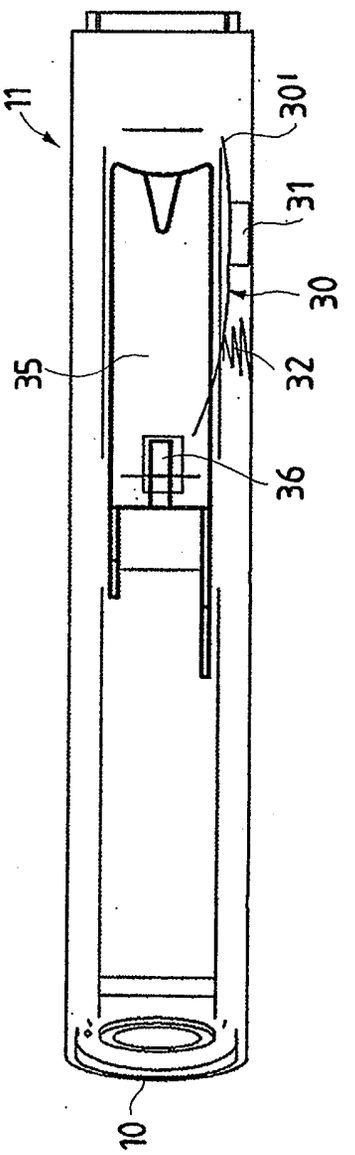
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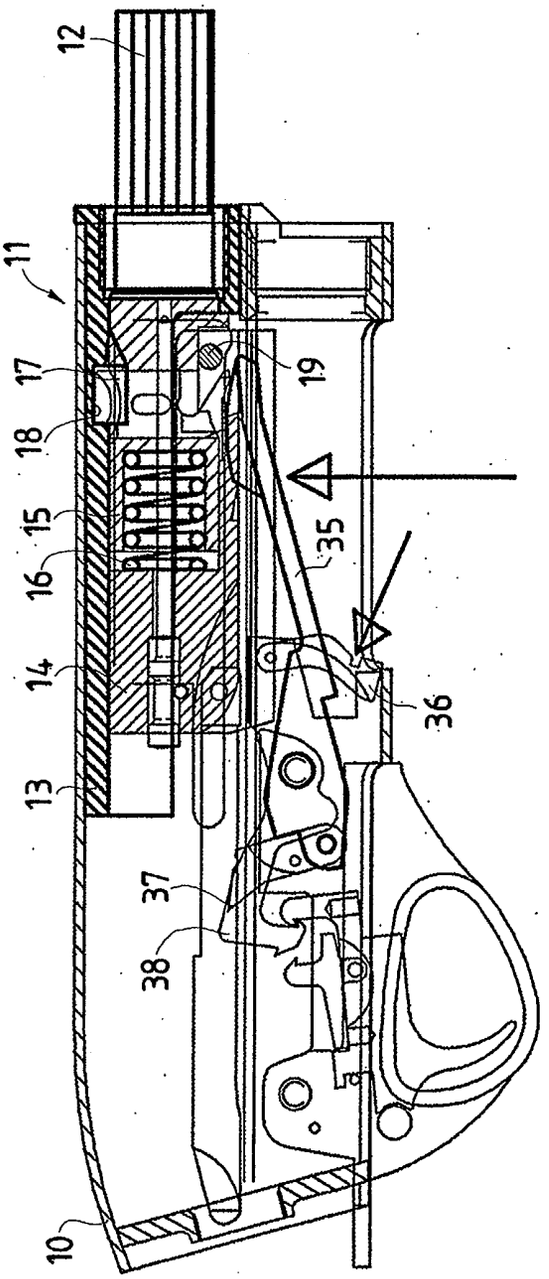
Fig.17



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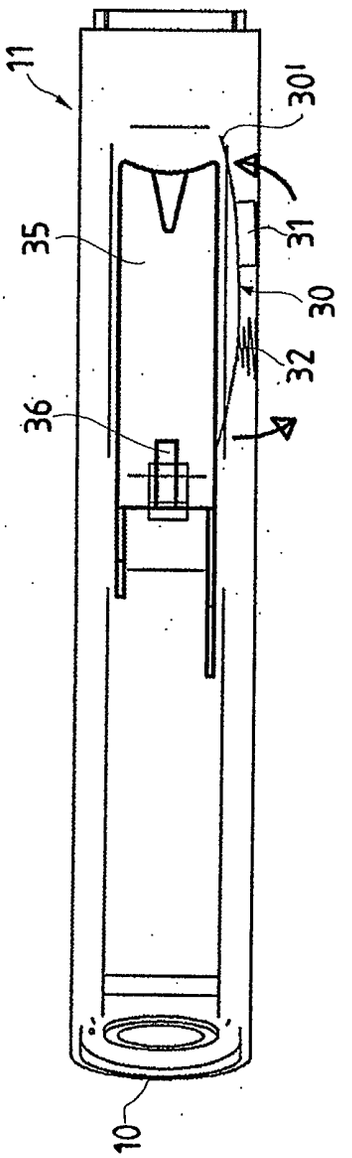

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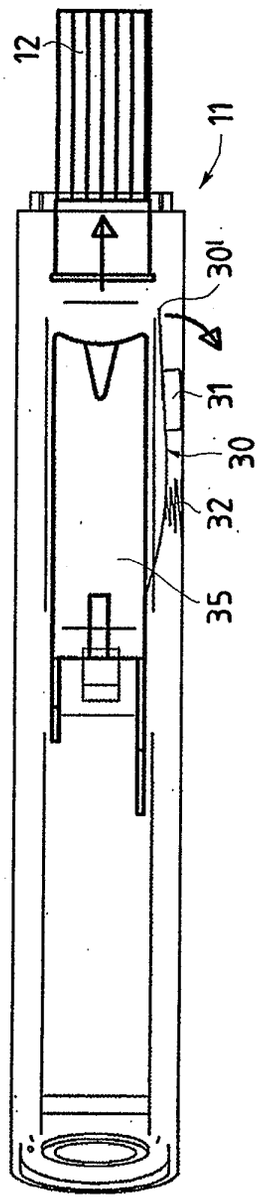

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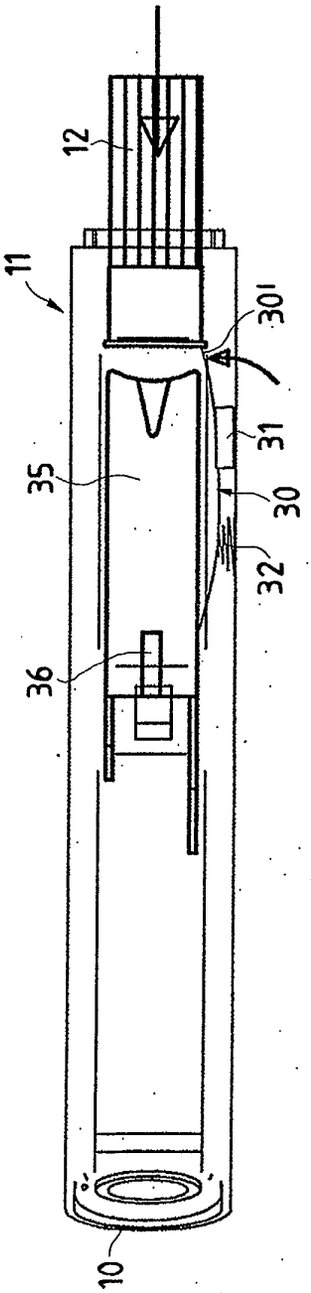

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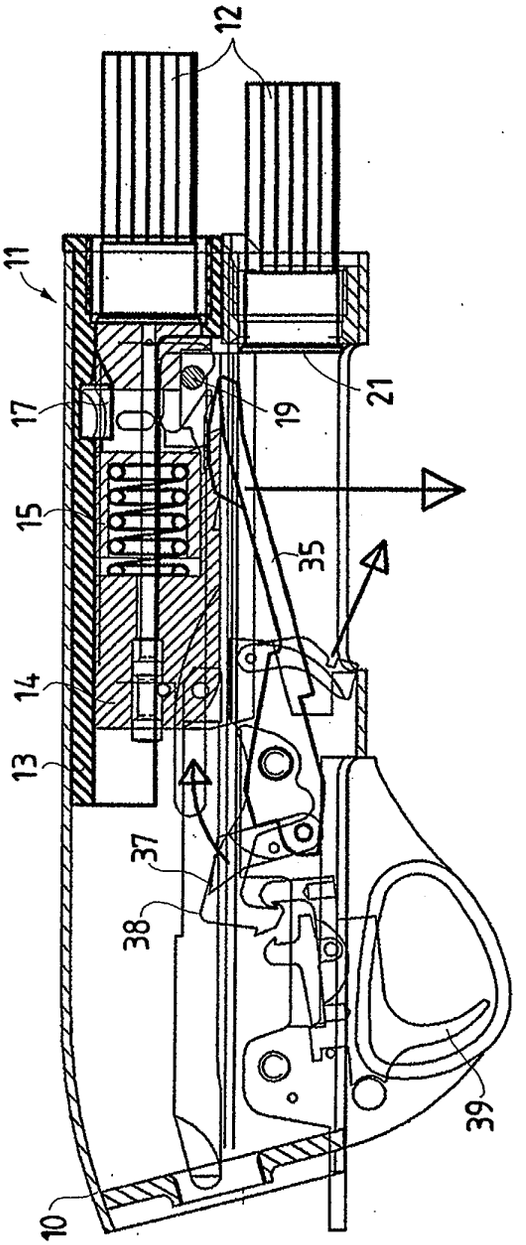

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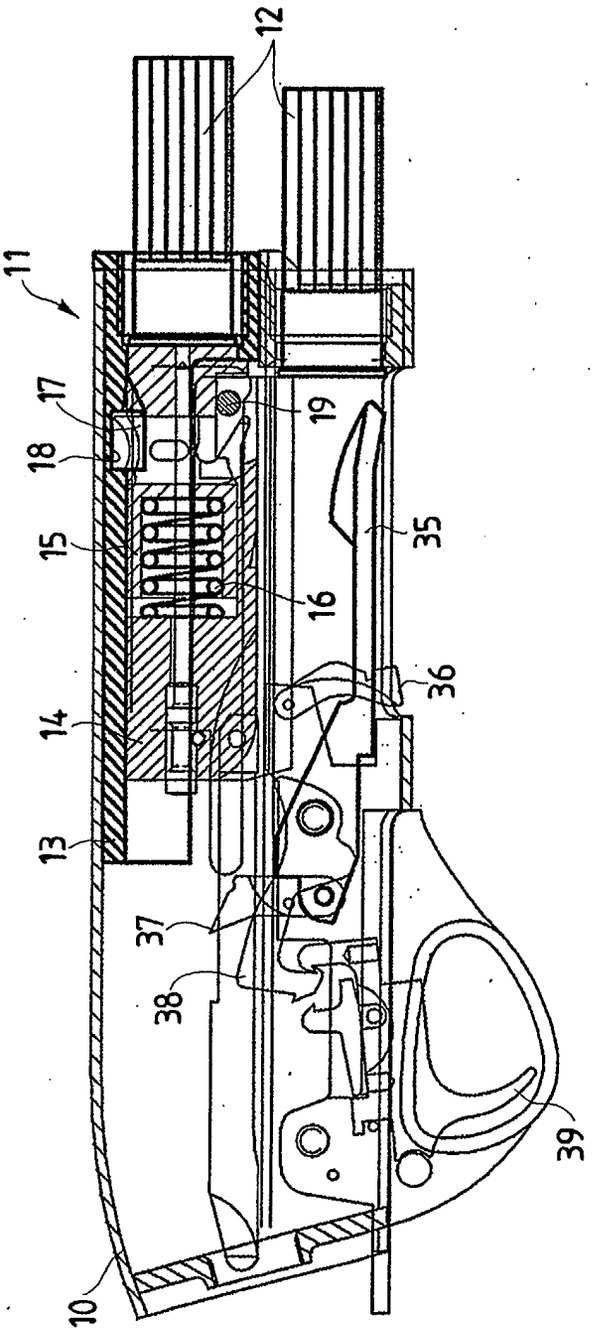
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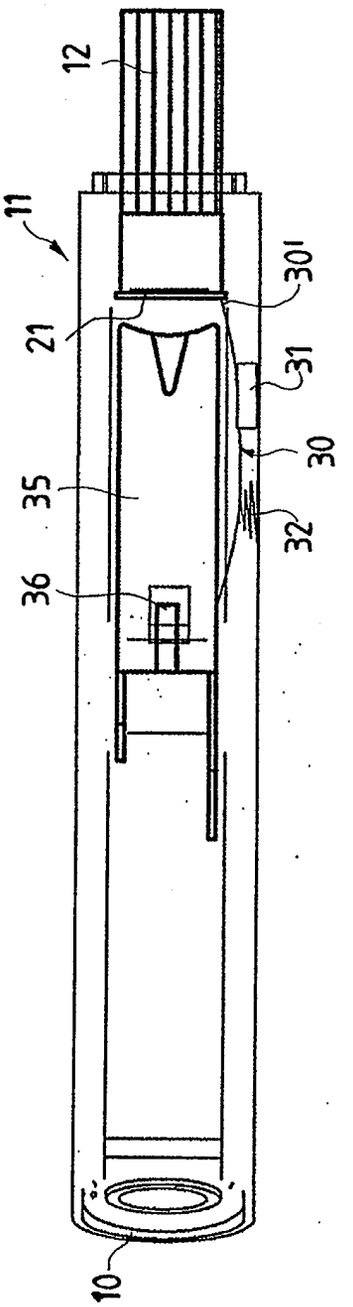
Fig.23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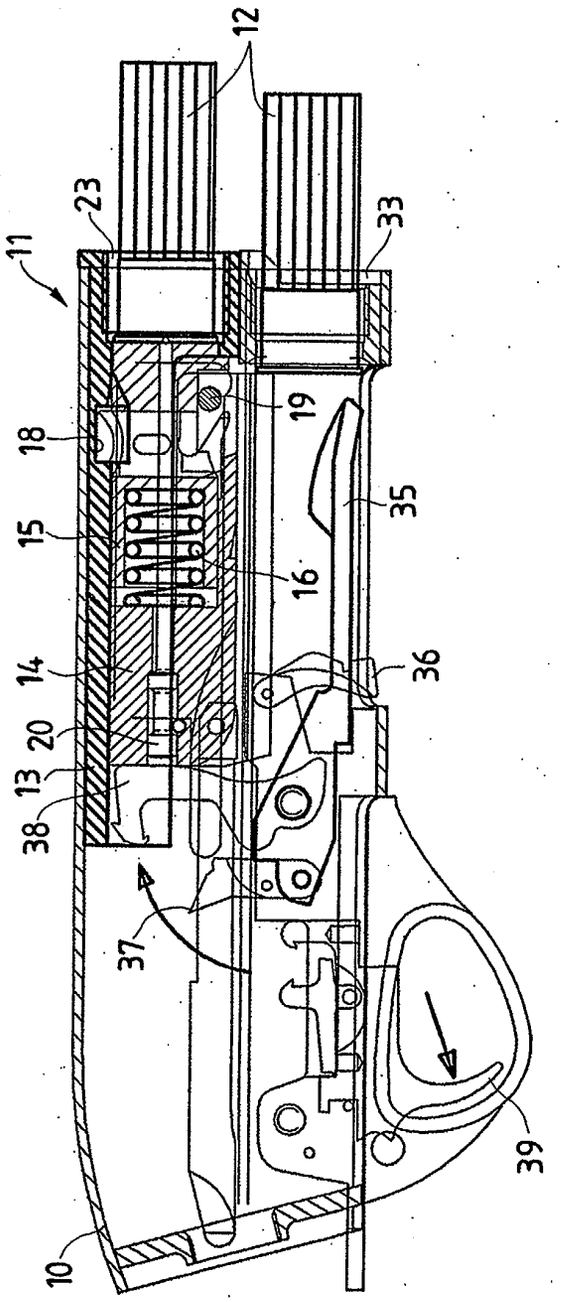
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Fig.24

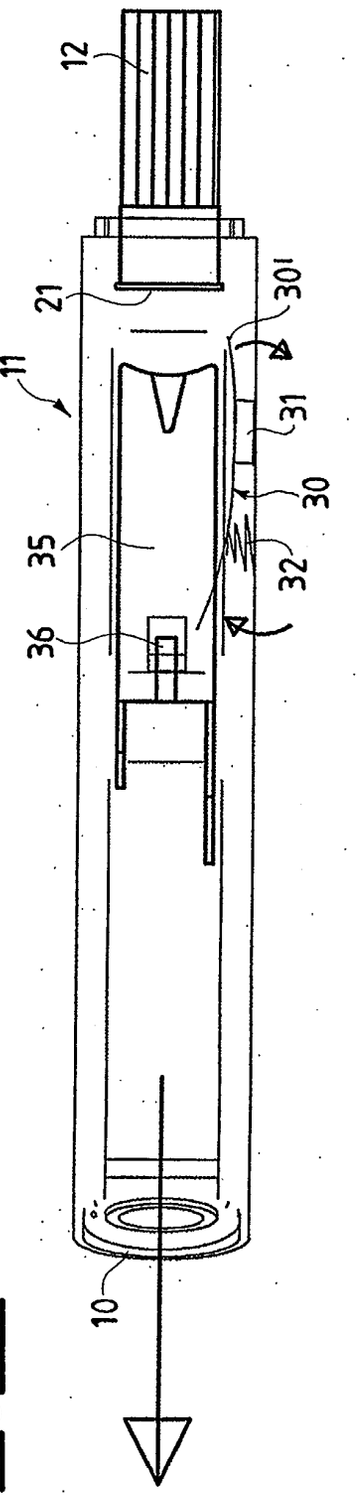
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Fig.25

Fig.26

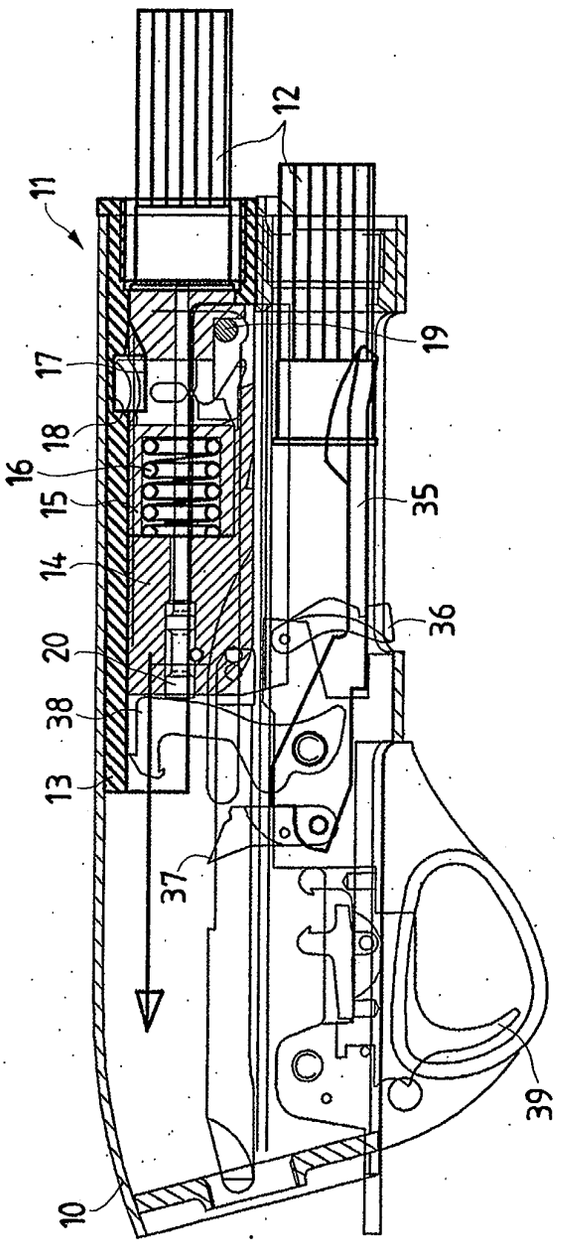
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Fig.27

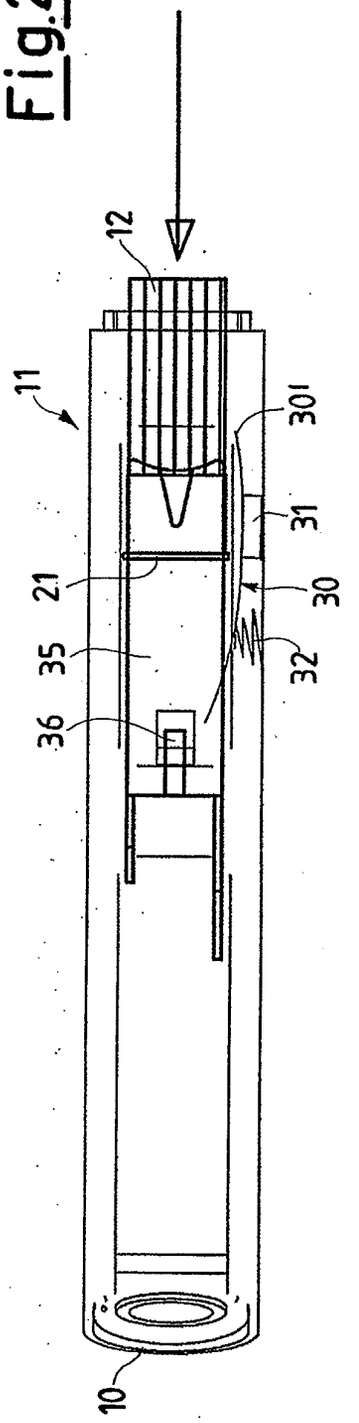
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Fig.28

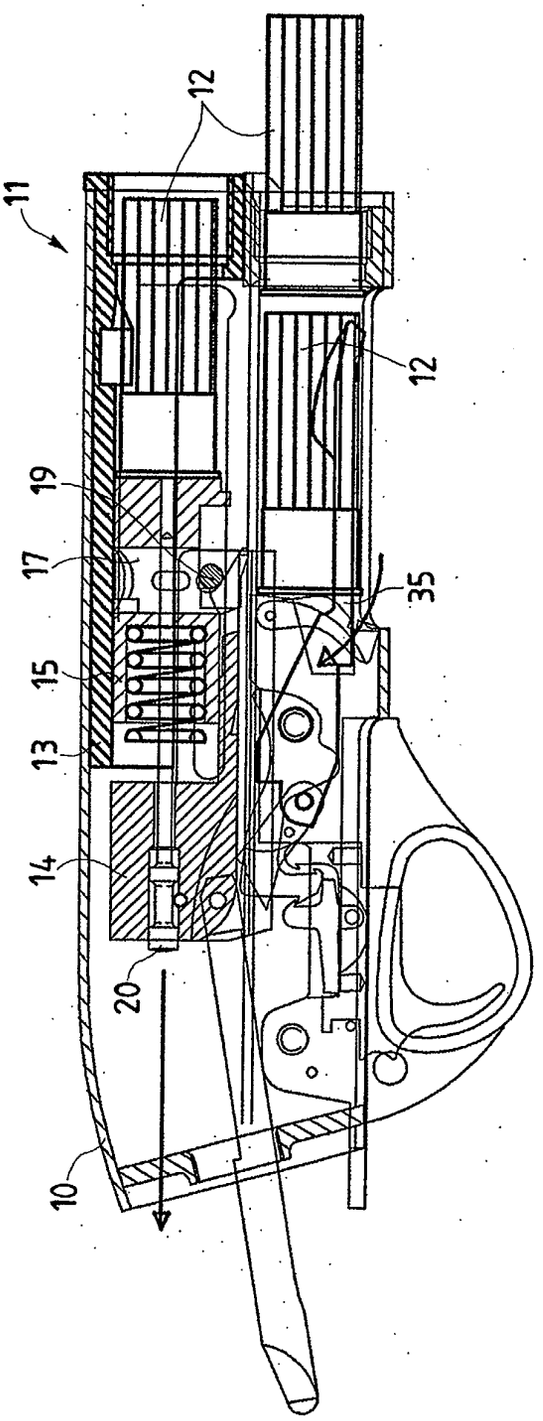


Fig.29

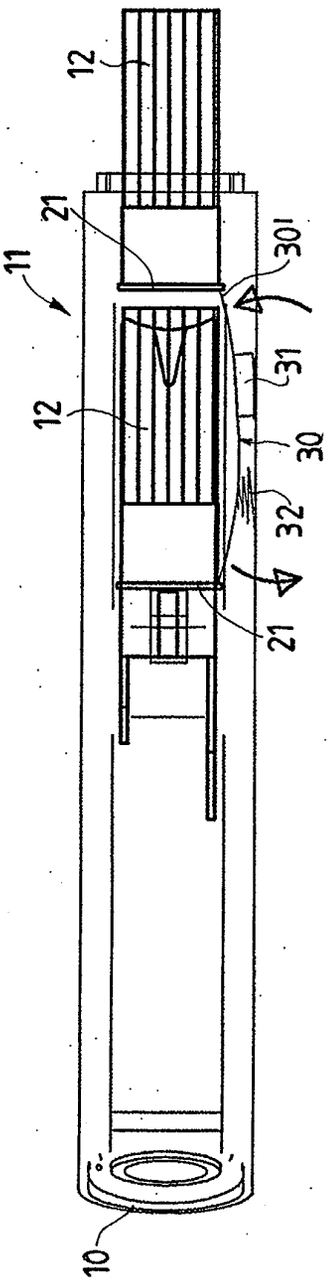
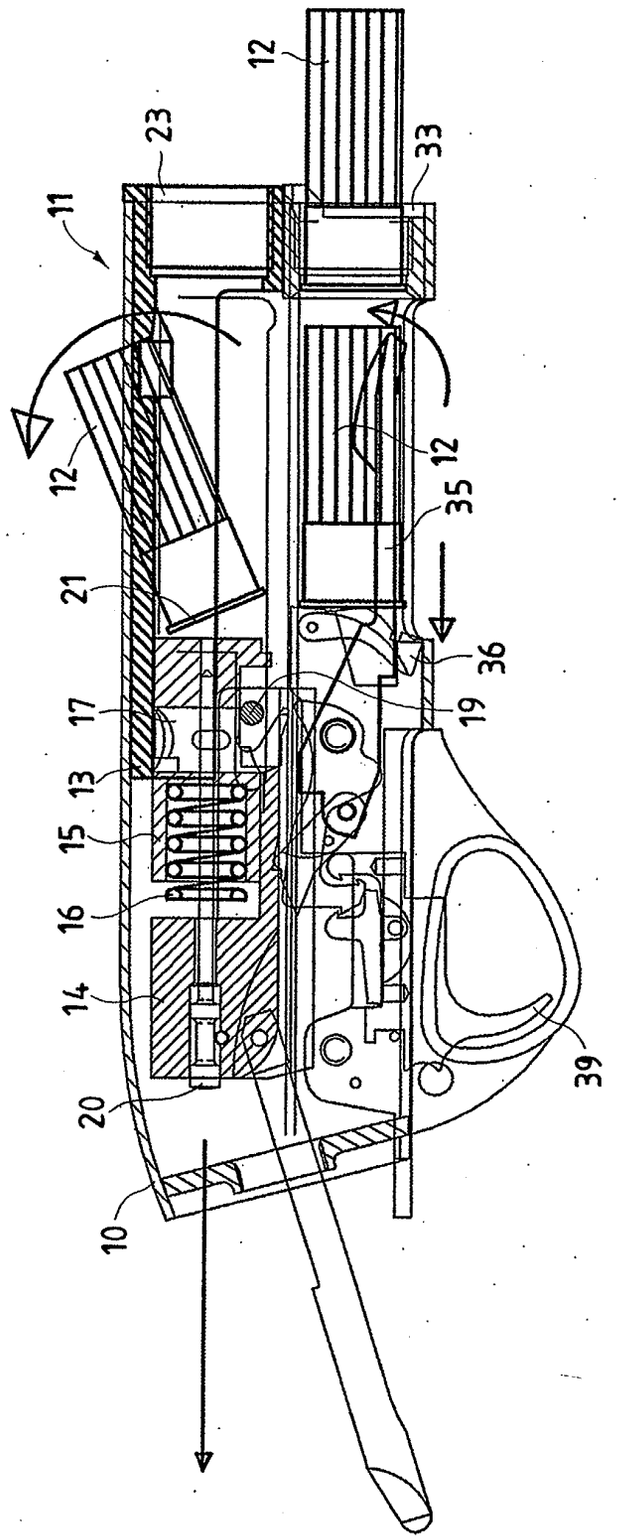


Fig.30



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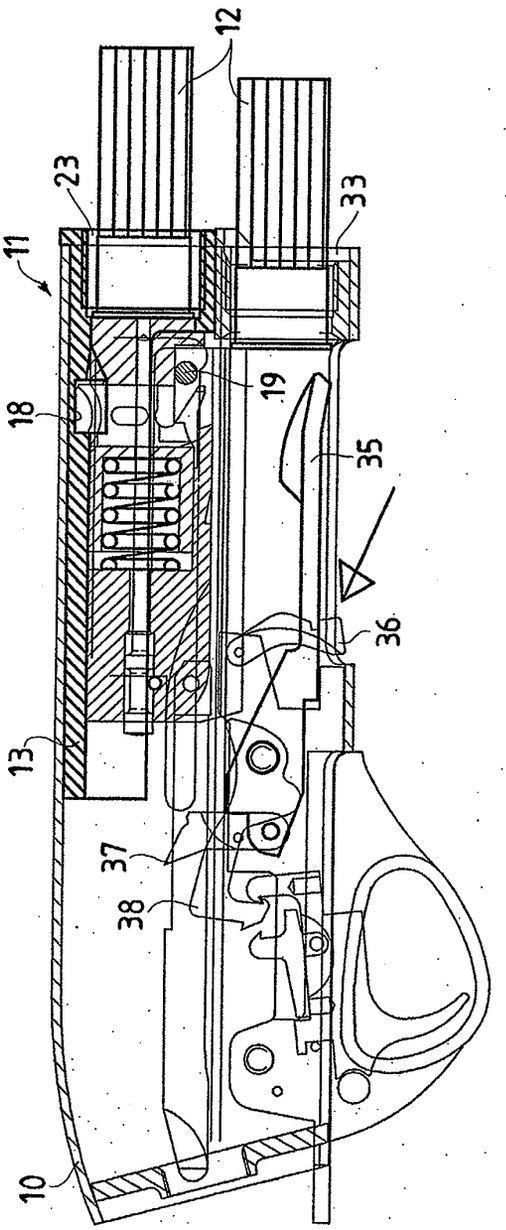

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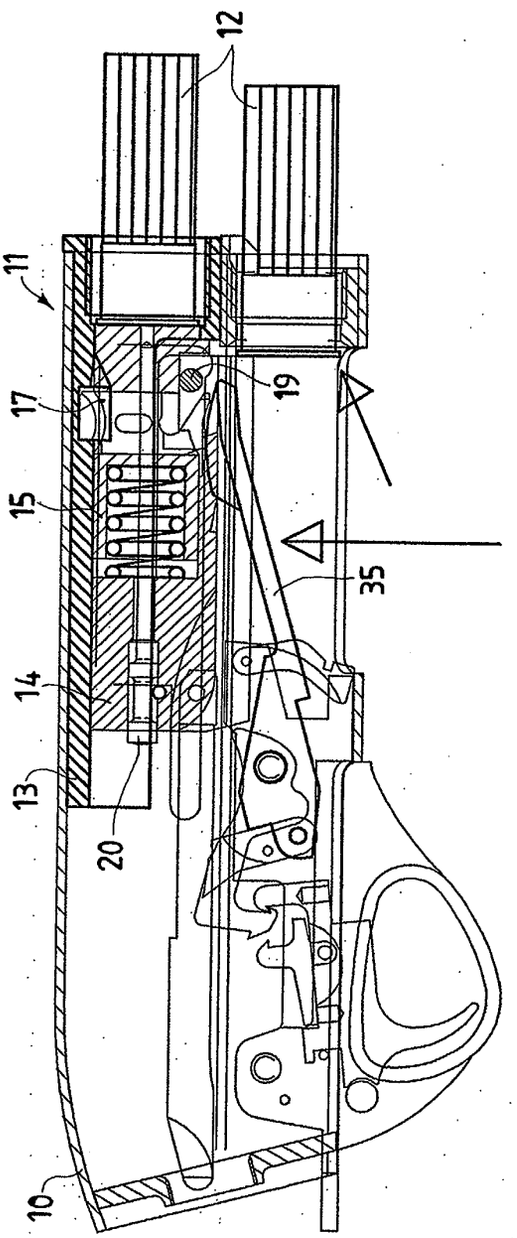

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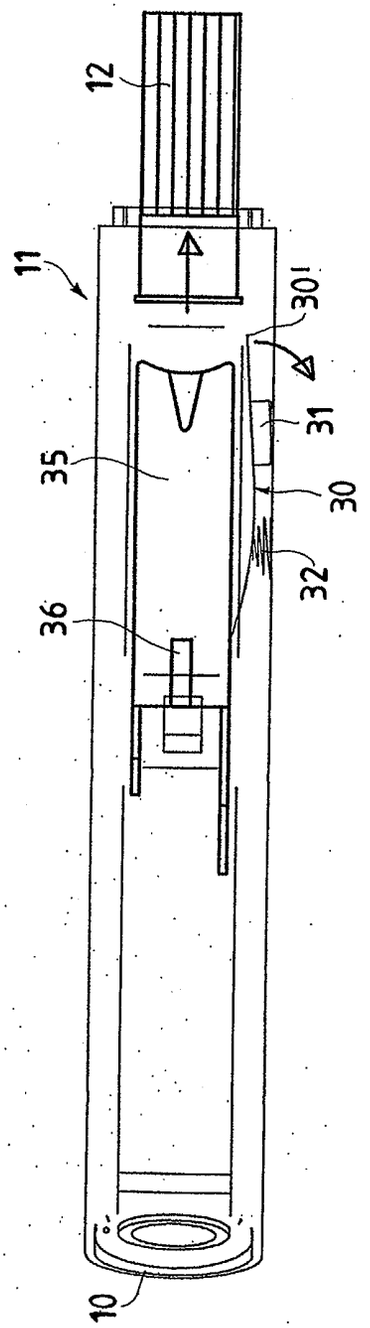

Fig.34

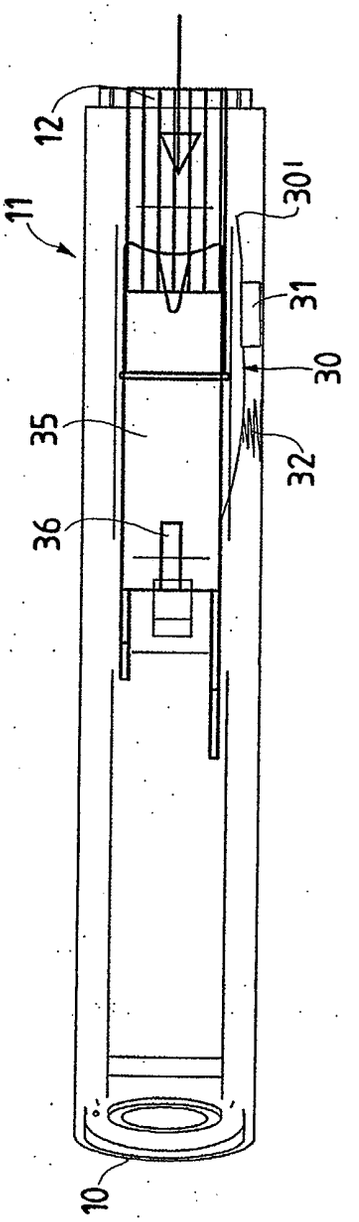

Fig.35

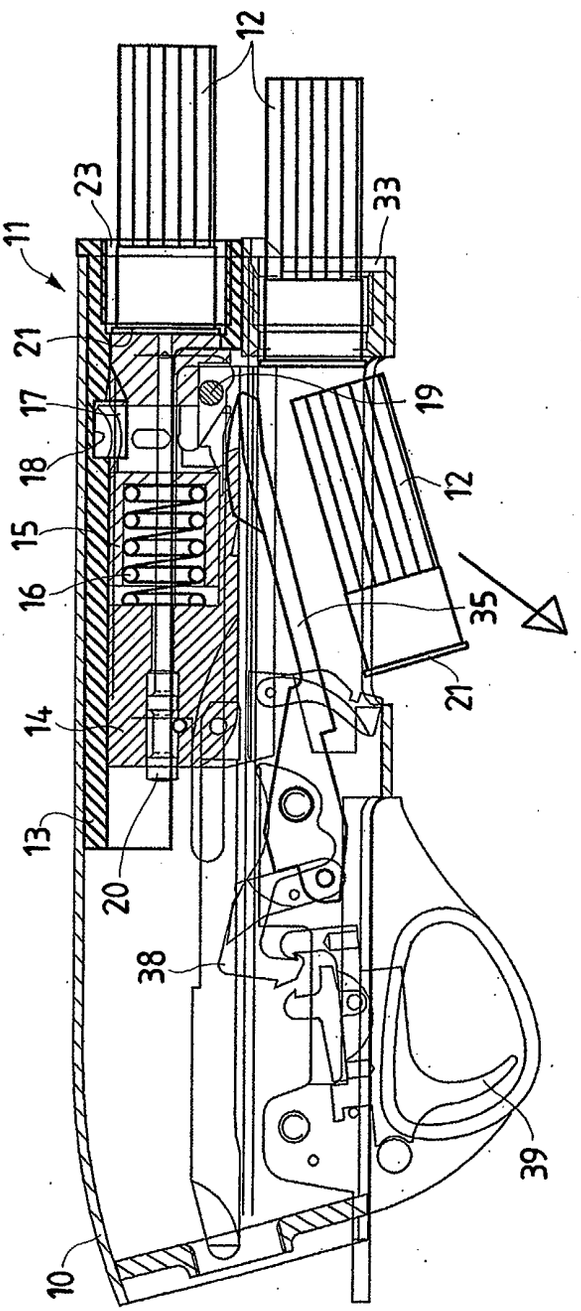
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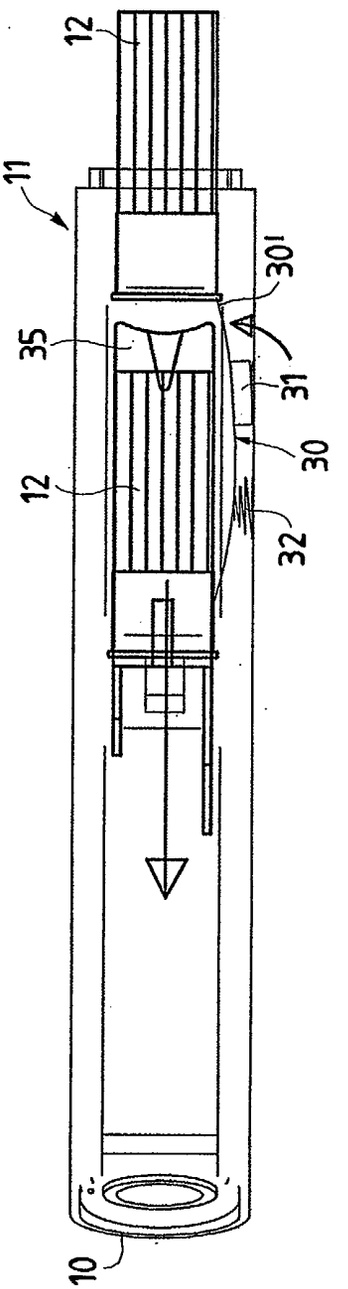
Fig.36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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 5696

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	US 2 887 808 A (WILD ET AL) 26 May 1959 (1959-05-26) * the whole document *	1-4 5-13	F41A9/18
X A	GB 649 519 A (ITALIANA ERNESTO BREDA PER COSTRUZIONI MECCANICHE) 31 January 1951 (1951-01-31) * the whole document *	1-4 5-13	
Y A	US 2 960 011 A (GEORGES BRETTON) 15 November 1960 (1960-11-15) * column 3, line 69 - column 8, line 7 * * figures 22-37 *	5-13 1-4	
A	US 3 919 800 A (BROWNING) 18 November 1975 (1975-11-18) * column 3, line 41 - column 4, line 38 * * column 5, line 1 - column 6, line 10 * * figures 2-13 *	1-5,9-12	
A	US 3 996 685 A (BAUMAN ET AL) 14 December 1976 (1976-12-14) * column 2, line 19 - column 4, line 61 * * figures 1,2,4,5 *	1-5,9-12	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F41A
A	US 3 373 519 A (DAHL ET AL) 19 March 1968 (1968-03-19) * column 2, line 54 - column 4, line 14 * * figures 1-4 *	1-3,9-12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 July 2003	Menier, R

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24-07-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2887808 A	26-05-1959	NONE	
GB 649519 A	31-01-1951	BE 473028 A	
		FR 946002 A	20-05-1949
US 2960011 A	15-11-1960	BE 556842 A	
		DE 1096806 B	05-01-1961
		FR 1150581 A	15-01-1958
US 3919800 A	18-11-1975	CA 1007496 A1	29-03-1977
US 3996685 A	14-12-1976	NONE	
US 3373519 A	19-03-1968	BE 709166 A	10-07-1968
		FR 1550897 A	20-12-1968

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