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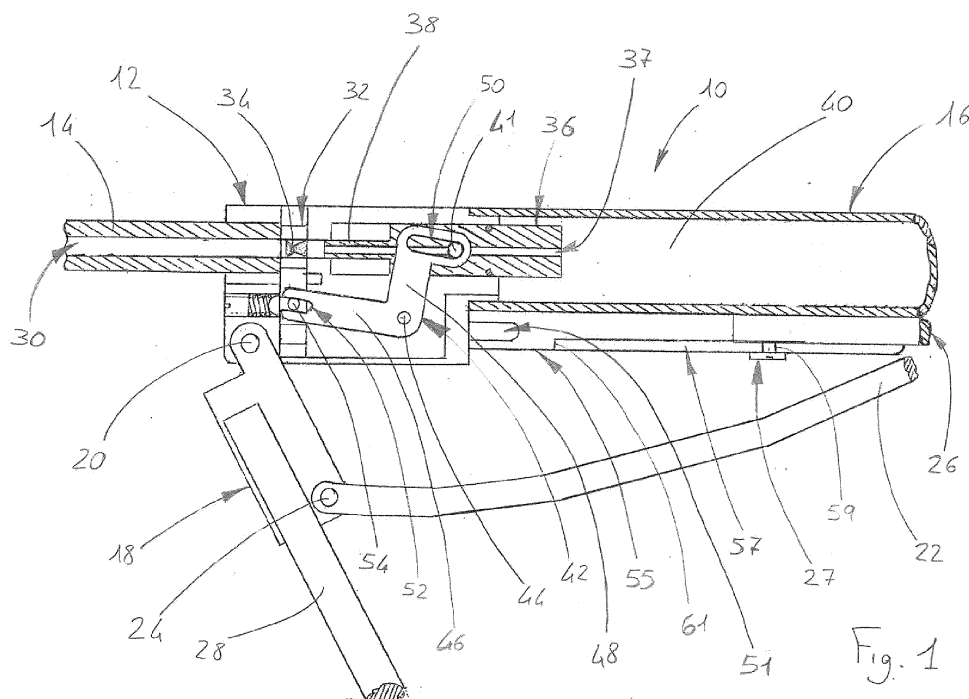
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(54) Compressed air weapon

(57) A compressed air weapon comprises a main body (12), a loader (32), adapted to contain one or more bullets (34) and movably connected to the main body, a reservoir (16), adapted to contain the compressed air and fixed to the main body. In addition, the compressed air weapon comprises a shot seat for the one or more bullets, adapted to receive the one or more bullets when the bullets are hit by the compressed air at the time of the shot, a hollow shot barrel (14), fixed to the main body and adapted to be traversed by the one or more bullets,

air compressing means (17), adapted to compress the air in the reservoir, positioning means to position the one or more bullets, said positioning means being adapted to move the one or more bullets from the loader to the shot seat and control means connected to said compressing means.

The control means are also connected to said positioning means so that both the compressing means and the positioning means are actuated by actuating the control means.



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Description

[0001] The present invention refers, in general, to a compressed air weapon.

[0002] More particularly, the present invention refers to a compressed air weapon operating through a spring-piston system.

[0003] A compressed air weapon is described below but it is to be intended that the described matter may be applied to a weapon using a generic compressed gas.

[0004] As is known, there exist several typologies of compressed air weapons that use different types of compressed fluid as a means to eject a bullet.

[0005] For instance, reservoirs containing carbonic anhydride or atmospheric air, compressed by means of mechanisms provided in the inside of the weapon itself, are utilized.

[0006] In fact, there exist guns or pistols that compress and store an amount of air through a translational or rotational movement of a component of said guns or pistols.

[0007] In carbines operating through a spring-piston system, for instance a lever put under the barrel or even the barrel itself may be rotated about a hinge by moving a piston so that the piston compresses a spring. The displacement of the piston allows an amount of air to flow into the inside of a reservoir. At the end of the piston stroke, the piston remains hooked in position and is ready for the shot.

[0008] When the operator pulls the trigger on shooting, the piston is unhooked and the thrust of the spring allows the amount of air, previously stored, to be compressed on ejecting the bullet.

[0009] In the known weapons, a further mechanism is utilized to load the bullet in its proper seat from which the bullet is then accelerated to be ejected, as described for instance in the patent document FR-A-2,053,421.

[0010] In the single-shot weapons, the bullet is positioned manually in the gun-barrel after the gun-barrel has been rotated and opened.

[0011] In the weapons with a revolver loader, the operator has to accomplish a first operation to fill the reservoir with air and a second operation to position the bullet in its proper seat for the shot.

[0012] However, the sequence of operations involves a complex loading before obtaining a weapon loaded and ready for the shot.

[0013] A further drawback of the known weapons with a revolver loader is the positioning of the bullet on shooting. In fact, the bullet is housed in its proper seat obtained in the rotary loader, which owing to its rotary nature is not able to optimize a good tight in respect to the air flow in order to ensure the exit of the bullet. In fact, when the air pushes the bullet, a portion of the air goes out in the interstices between the loader and the entry of the barrel.

[0014] Besides, on shooting, the bullet has to go out of its seat in the loader and enter the barrel owing to the thrust of the compressed air so that the bullet encounters discontinuous profiles which are inevitably present be-

tween the two elements.

[0015] An aim of the present invention is to propose a new loading system for compressed air weapons in order to improve their operation and to make their use easier.

[0016] Another aim of the present invention is to allow a simultaneous loading of compressed air and optimal positioning of the bullet in the weapon.

[0017] Said aims and advantages are reached according to the invention with a compressed air weapon comprising a main body, a loader, adapted to contain one or more bullets and movably bound to the main body, a reservoir, adapted to contain the compressed air and fixed to the main body, a shot seat for the one or more bullets, adapted to receive said one or more bullets when the bullets are hit by the compressed air at the time of the shot, a hollow shot barrel, fixed to the main body and adapted to be traversed by the one or more bullets, air compressing means, adapted to compress the air in the reservoir, positioning means to position the one or more bullets, said positioning means being adapted to move the one or more bullets from the loader to the shot seat, control means, connected to said compressing means; said control means are also connected to said positioning means so that both the compressing means and the positioning means are actuated by actuating the control means.

[0018] With such an embodiment, the only actuation of the control means allows to actuate both the positioning means and the compressing means on simplifying the management operations of the compressed air weapon and shortening the downtime between a shot and the other.

[0019] In fact, an operator may actuate the control means and obtain a compressed air weapon ready for the shot, without the necessity of performing additional operations.

[0020] The compressed air weapon according to the invention is characterized by the fact that the positioning means comprises a shutter slidingly constrained to the main body, said shutter being provided with a pin, adapted to traverse the loader in order to move the one or more bullets from the loader to the shot seat in the shot barrel.

[0021] The presence of the pin allows to obtain a displacement of the bullet from the loader to its shot seat in a different time from the shooting time so as to bring the bullet to a seat that is more congenial for the shot than the loader itself.

[0022] In addition, the positioning means may comprise an oscillating element which is connected to the main body so as to rotate and which in turn comprises a first arm, adapted to make the loader move and a second arm, coupled through coupling means with the shutter so that the oscillating element rotates when the shutter translates.

[0023] With said conformation, the movements of the loader, for instance its rotation, may be bound to the translation of the shutter so as to synchronize the relative movements.

[0024] A further advantage may consist in the fact that the positioning means comprises a tooth which is connected to the main body so as to slide and a U-shaped throat is obtained in the first arm of the oscillating element, and said tooth is adapted to get in contact with the loader so as to make it move and said U-shaped throat is adapted to receive the tooth so that a translation of the tooth corresponds to a rotation of the first arm.

[0025] In this conformation, the loader may be moved, for instance rotated, by the tooth when the tooth is moved by the first arm of the oscillating element and the rotating movement of the oscillating element may be converted into a translating movement of the tooth.

[0026] Advantageously, the control means may comprise one or more carriages, constrained to the main body so as to slide and connected to the coupling means.

[0027] In this way, a simple translation of the one or more carriages actuates the coupling means so as to translate the shutter and rotate the oscillating element.

[0028] Besides, the coupling means may comprise an oblong hole, obtained in the second arm of the oscillating element and said oblong hole receives a rivet which is constrained to the shutter.

[0029] This configuration allows to convert the translating motion of some elements into the rotating motion of other elements through a connection of oblong hole and rivet.

[0030] A further advantage may consist in the fact that the control means may comprise a first carriage and a second carriage which are connected to each other and both carriages are connected to the main body so as to slide, a guide forming a first stroke end and a second stroke end being obtained in said second carriage and in which the control means comprises also a screw, constrained to the first carriage, the second carriage being constrained to the first carriage so as to slide so that the screw abuts alternately against the first stroke end and the second stroke end so that the second carriage is moved for a translation of a smaller width than the translation of the first carriage, the second carriage being connected to the positioning means.

[0031] In this way, it is possible to have to carriages performing a dependent movement but only for a certain portion of the respective movements. This feature allows that some elements may be moved by the first carriage and have a continuous motion while other elements may be moved by the second carriage and have an intermittent motion so that they remain in a predetermined position while the elements moved by the first carriage are in motion.

[0032] Besides, the first carriage may be connected to the gas compressing means so that the compressing means processes the gas for at least a portion of the translation of the first carriage.

[0033] Advantageously, the control means may comprise a lever, hinged to the main body and adapted to be rotated manually. The lever may be hinged to a connecting rod which in turn is hinged to the first carriage so that

the rotation of the lever provokes at least a partial translation of the first carriage and/or the second carriage.

[0034] In this way, the actuation of the control means is facilitated and simplified for an operator since the operator is able to actuate both the compressing means and the positioning means by actuating an only lever so that the operator may prepare the compressed air weapon simply and quickly for the next shot.

[0035] In addition, the shot seat may be in the inside of the shot barrel. In this way, it is possible to obtain a positioning of the bullet directly in the inside of the shot barrel from which the bullet will be then ejected without overcoming other surface discontinuities in the inside of the compressed air weapon, the tight being thus improved.

[0036] Further features and details may be better understood from the following description that is given as a non-limiting example as well as from the accompanying drawings wherein:

Fig. 1 is a schematic sectional view of the left side of a compressed air weapon, disposed in an open configuration according to the invention;

Fig. 2 is a schematic sectional view of the left side of a compressed air weapon, disposed in a closed configuration according to the invention;

Fig. 3 is a schematic sectional view of the right side of a compressed air weapon, disposed in the open configuration of Fig. 1 according to the invention;

Fig. 4 is a schematic sectional view of the right side of a compressed air weapon, disposed in the closed configuration of Fig. 2 according to the invention.

[0037] With reference to the accompanying drawings, in particular Figure 1, number 10 denotes a compressed air weapon comprising a main body 12, a barrel 14 being constrained to a first end of the main body 12 and a reservoir 16 being constrained to the second end of the main body 12.

[0038] An end of a lever 18 is hinged by means of a hinge 20 to the main body 12 while the other end of the lever 18 is hinged by means of a hinge 24 to a connecting rod 22. In addition, the connecting rod 22 is hinged by means of a hinge 29 to a first carriage 26, as represented in Figure 2.

[0039] The first carriage 26 is constrained to the reservoir 16 with the possibility of sliding so that the first carriage 26 is free to translate on trailing a mechanism 17. The mechanism 17, as shown in Figure 2, is to compress the air and is carried out according to the known art. The mechanism 17 is called spring-piston and is contained in the reservoir 16.

[0040] Besides, the lever 18 comprises a stick 28 which extends according to a main direction beyond the hinge 24. Thus, an operator can grasp the stick 28, which is connected to the lever 18, and rotate the lever 18 so that the rotation of the lever 18 provokes a sliding of the first carriage 26 and transmits the motion to a second carriage

55, as described below. A guide 57 is obtained in the second carriage 55 and has a first stroke end 59 and a second stroke end 61 against which the screw 27 abuts.

[0041] A through-hole 30 is obtained in the inside of the barrel 14. The through-hole 30 aligns and communicates with a seat of a loader 32, for instance a drum-shaped loader, which in turn is connected rotatably to the main body 12 of the weapon 10. The axis of rotation of the loader 32 is parallel to the barrel 14.

[0042] In a loader 32, shaped substantially like a disc, a plurality of seats are obtained to contain one or more bullets 34 which are positioned each time in correspondence of the hole 30 of the barrel 14.

[0043] A substantially cylindrical shutter 36 is housed inside the main body 12. A pin 38 protrudes from the end of the shutter 36 and has a shorter diameter than the shutter 36. A through-hole 37 is obtained in the shutter 36 to allow communication between an air chamber 40 inside the reservoir 16 and the hole 30 of the barrel 14. Besides, a nail 41 is constrained to the shutter 36 and is disposed in a perpendicular direction in respect to the hole 37 of the shutter 36.

[0044] An oscillating element 42 shaped substantially like an L is hinged on the main body 12 by means of a fulcrum 44 and may rotate around the fulcrum 44 between two limit positions represented in Figure 1 and Figure 2, respectively. The oscillating element 42 comprises a first arm 46 that develops from the fulcrum 44 towards the loader 32 and a second arm 48 that develops from the fulcrum 44 towards the loader 36 and forms a right angle with the first arm 46. An oblong hole 50 is obtained at the end of the second arm 48 and receives a nail 41. The oblong hole 50 extends parallel to the first arm 46 and constrains the rotation of the oscillating element 42 to the translation of the shutter 36 so that a rotation of the oscillating element 42 corresponds a translation of the shutter 36.

[0045] A groove 52 having substantially a U-shape is obtained at an end of the first arm 46 and is adapted to move a tooth 54. The tooth 54 slides in a proper seat obtained in the main body 12. Said seat allows the tooth 54 to be translated from a rest position, represented in Figure 2, in which the tooth 54 is far from the barrel 14 to a working position, represented in Figure 1, in which the tooth is nearer to the barrel 14. Once the tooth 54 has been translated in the working position, the tooth engages the loader 32 so as to rotate the loader 32 for a predetermined quantity when the tooth 54 itself translates.

[0046] As shown in Figures 3 and 4, the second carriage 55 has a substantial L-shape since this carriage comprises a long portion 56, which is constrained slidingly to the reservoir 16 by means of two rivets 58, and a short portion 60, which develops orthogonally from an end of the long portion 56.

[0047] The free end of the short portion 60 is constrained to the nail 41. Two rails 51 are obtained in the long portion 56 and receive one of the two nails 58, re-

spectively on allowing the second carriage 55 to translate according to a direction parallel to the barrel 14.

[0048] Now, there is a description of the operation of the compressed air weapon 10 according to the invention.

[0049] With reference to figure 1, after an operator has disposed the weapon 10 according to the open configuration and has positioned one or more bullets inside the seats of the previously extracted loader 32, the operator constrains the loader 32 again to the main body 12 by using known means.

[0050] Then, the operator disposes the weapon 10 according to the open configuration in which the lever 18 is completely rotated on maintaining the first carriage 26 to the maximum distance from the main body 12 by means of the connecting rod 22.

[0051] As shown in Figure 3, the first carriage 26 in turn maintains the second carriage 55 away from the main body 12 by means of the screw 27 resting on the first stroke end 59. The second carriage 55 maintains the shutter 36 away from the loader 32 and bullet 34 by means of the nail 41.

[0052] As shown in Figure 1, the nail 41 maintains also the oscillating element 42 rotated around the fulcrum 44 so that the tooth 54 is in the operative position. The operative position of the tooth 54 does not prevent the operator from inserting the loader 32 in the main body 12 and obtaining an alignment of the bullet 34 with the hole 30 of the shot barrel 14.

[0053] For the preparation of the compressed air weapon to the shot, the operator acts on the lever 18 to gradually return the lever to the closed configuration in Figure 4 on having all the inner components of the weapon 10 moved.

[0054] The rotation of the lever 18 directly affects the translation of the first carriage 26 by means of the connecting rod 22 while indirectly affects the translation of the second carriage 55 by means of the connection between screw 27 and guide 57.

[0055] A first partial rotation of the lever 18 involves a translation only of the first carriage 26 while the second carriage 55 does not undergo displacements. In this first partial rotation of the lever 18, the screw 27, constrained to the first carriage 26, runs along the whole guide 57 from abutting with the first stroke end 59 to abutting with the second stroke end 61.

[0056] If the operator continues to rotate the lever 18, the further translation of the first carriage 26 provokes now also the translation of the second carriage 55, motionless up to now, because the second carriage is trailed by the screw 27. During its translatory motion, the second carriage 55 drags the nail 41 and provokes the displacement of the shutter 36 and, consequently, of the pin 38. The pin 38 passes through the loader 32 and pushes the bullet 34 towards the inside of the hole 30 in the shot barrel 14.

[0057] The displacement of the shutter 36 provokes, through the nail 41, also the rotation of the oscillating

element 42 which in turn translates the tooth 54 so that the tooth 54 takes up a rest position as shown in Figure 2.

[0058] In this way, it is possible to reach the closed configuration as shown in Figures 2 and 4.

[0059] When the lever 18 and the stick 28 are parallel to the shot barrel 14 and the first carriage 26 arrives near the main body 12, the weapon is ready to compress the gas contained in the reservoir 40 and therefore, the weapon is ready to shoot because the operator has already intaken the necessary air for the propulsion of the bullet 34 by acting on the lever 18 in order to obtain the open configuration in Figure 1.

[0060] The operator presses the trigger to shoot, not represented in the figure, so as to compress the gas, intaken previously in the air chamber 40 through the hole 37 of the shutter 36 so that the same air pushes the bullet 34 in order to eject the bullet out of the shot barrel 14.

[0061] Once the shot has been effected, the operator may prepare the weapon 10 for the next shot by rotating the lever 18 from the closed configuration to the open configuration and returning finally to the closed configuration on obtaining thus a weapon ready to shoot.

[0062] In fact, when the operator rotates the lever 18 by grabbing the stick 18 to reach the open configuration, the operator moves the first carriage 26 directly on charging the air by means of the compressing mechanism 17. After a first portion of rotation of the lever 18, the screw 27 passes from the second stroke end 61 to the first stroke end 59.

[0063] A further rotation of the lever 18 involves a translation of the second carriage 55, which was motionless previously, which allows the exit of both the shutter 36 and the pin 38 from the seat of the loader 32, which was taken up previously.

[0064] Before reaching the open configuration, the last portion of rotation of the lever 18 provokes the rotation of the oscillating element 42 owing to the interaction of the nail 41 with the oblong hole 50 so that the tooth 54 translates and engages the loader 32 causing it to rotate for a predetermined angle and the seat of the next bullet is brought in line with the hole 30 of the shot barrel 14. Thus, the rotation of the loader 32 takes place only in the last portion of rotation of the lever 18 when the pin 38 of the shutter 36 is not inserted in the loader 32.

[0065] The compressed air weapon 10 is now disposed according to the open configuration as represented in Figures 1 and 3.

[0066] When the operator puts the weapon again in the closed configuration as represented in Figure 2 or 4, the shutter 36 and consequently the pin 38 may push again the next bullet inside the hole 30 of the shot barrel 14 so as to obtain a weapon 10 ready to shoot.

[0067] With a simple operation of rotation of the lever 18 by the operator, the compressed air weapon obtains, in an only simple rotating motion, the air compression and the loading of the bullet to be arranged for the next shot.

[0068] The displacement of the bullet in the weapon

according to the invention from the seat obtained in the loader to the hole of the shot barrel through the translation of the shutter is advantageous because the passage of the bullet from the loader to the shot barrel is accomplished in the moment preceding the shot so that the discontinuity between loader and shot barrel does not affect the efficiency of the shot as it occurs in the weapons of the known art. Accordingly, the movement of the pin brings the bullet directly in the hole of the shot barrel and air losses are avoided.

[0069] The presence of the second carriage, connected to the first carriage in the manner according to the invention, allows to simultaneously obtain two typologies of movements by taking advantage of the simple rotation of the lever. In fact, when the operator moves the lever with a continuous movement, also the first carriage accomplishes a continuous movement with a long run, which is useful for compressing air, while the second carriage moves only when the first carriage is on the point of finishing its run both in the one direction and in the other direction. In this way, the components connected to the second carriage are maintained still while the components connected to the first carriage are moved.

[0070] According to a variant of the invention, a loader may comprise outer teeth, obtained on the outer surface of the loader, to engage the tooth controlled by the oscillating element.

[0071] According to another variant of the invention, a loader may comprise a rubber ring which is to maintain the bullets in the loader seat. The rubber ring surrounds the loader partially and is also adapted to damp the action of the tooth and is also adapted to facilitate the return of the tooth to the rest position after the tooth itself has rotated the loader. In this way, the tooth engages appropriately when it translates to make the loader rotate while the tooth itself does not make the loader rotate in the opposite direction when it translates in the opposite direction.

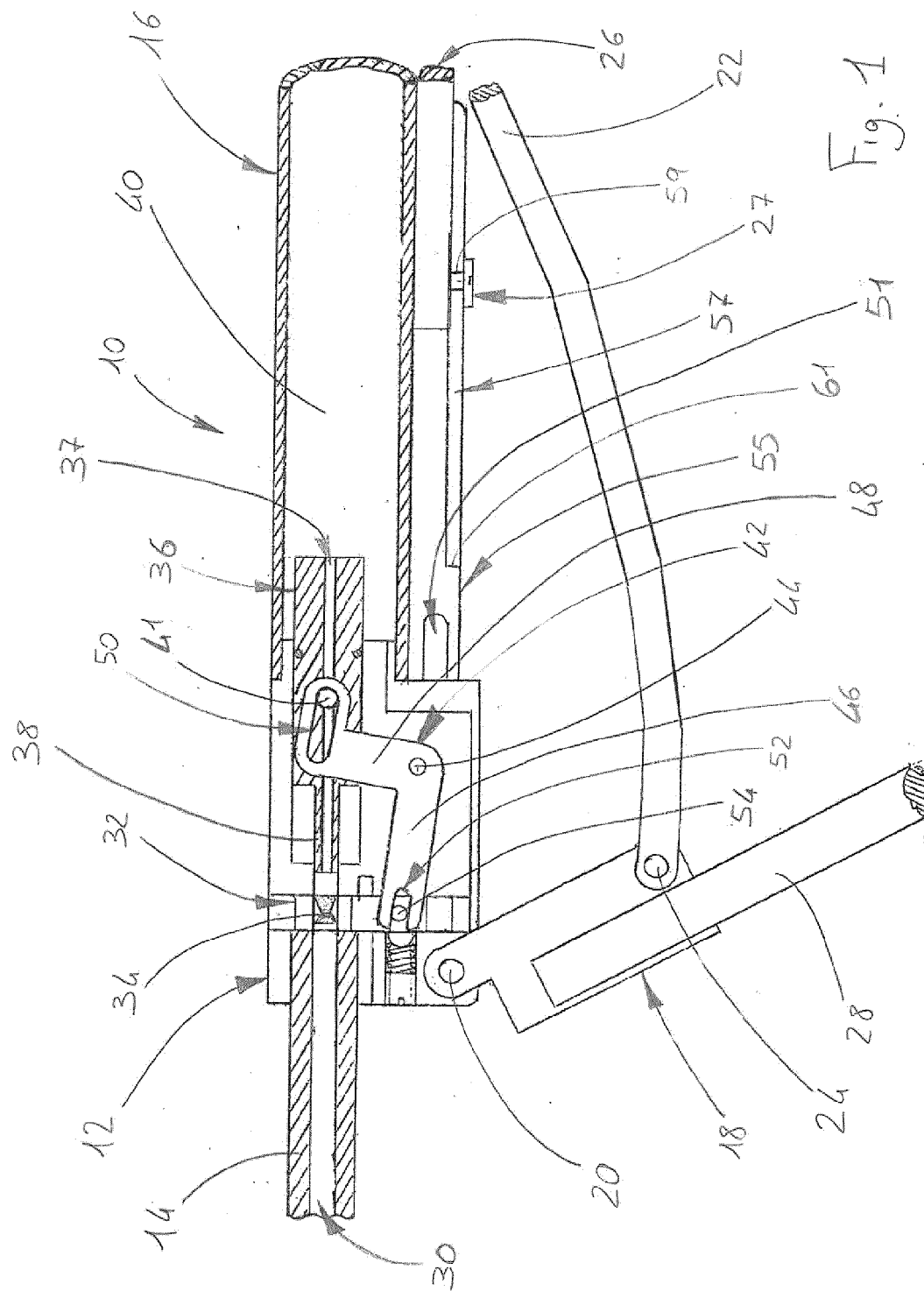
[0072] The invention has been described according to an embodiment but it is to be intended that the scope of the invention is extended also to other variants. For instance, the movement of the first carriage may be actuated by the operator directly with a component different from the previously described lever, that is a mechanism similar to the one utilized in the pump rifles, or even the first carriage may be actuated by the operator with an electric motor.

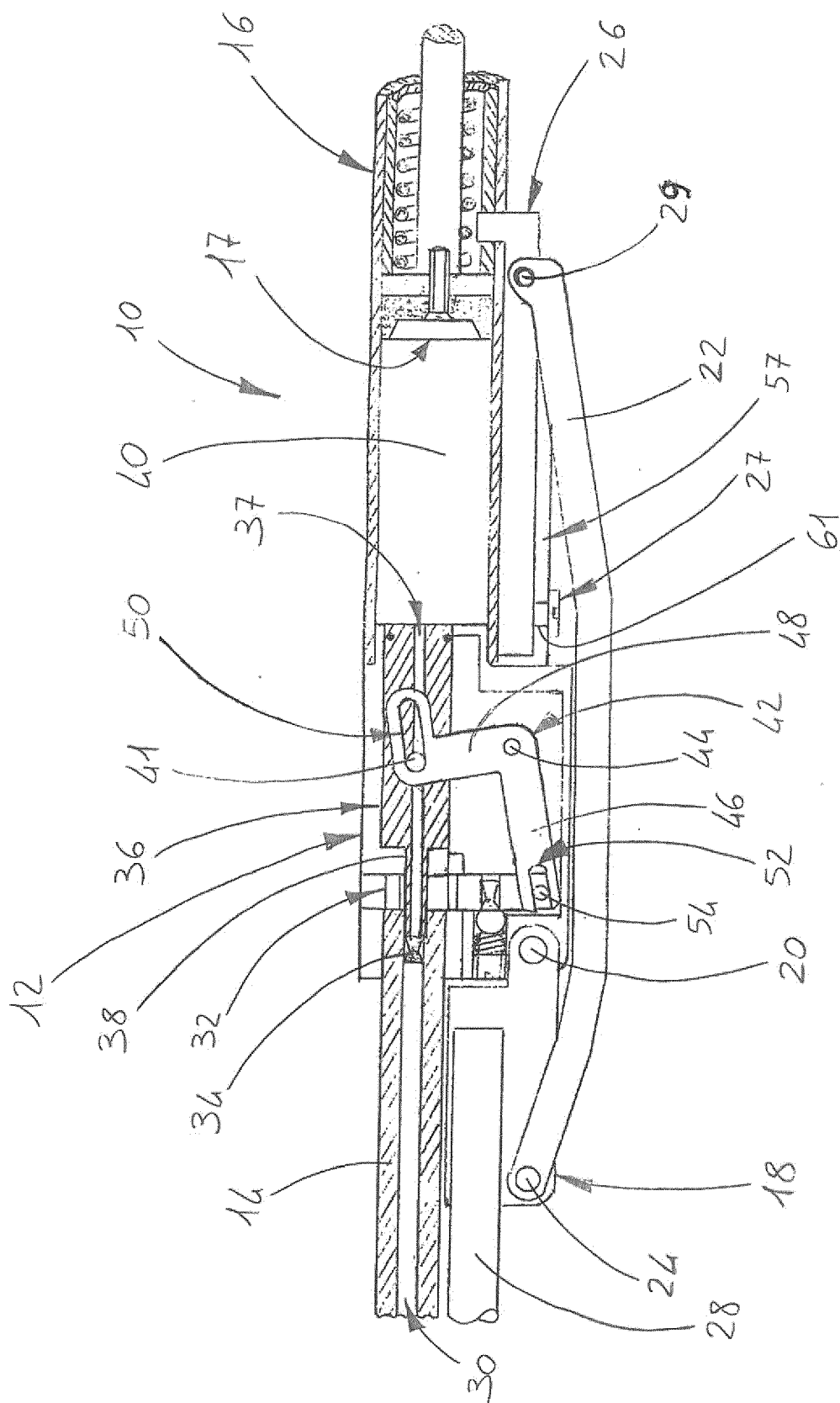
Claims

1. Compressed air weapon (10) comprising:

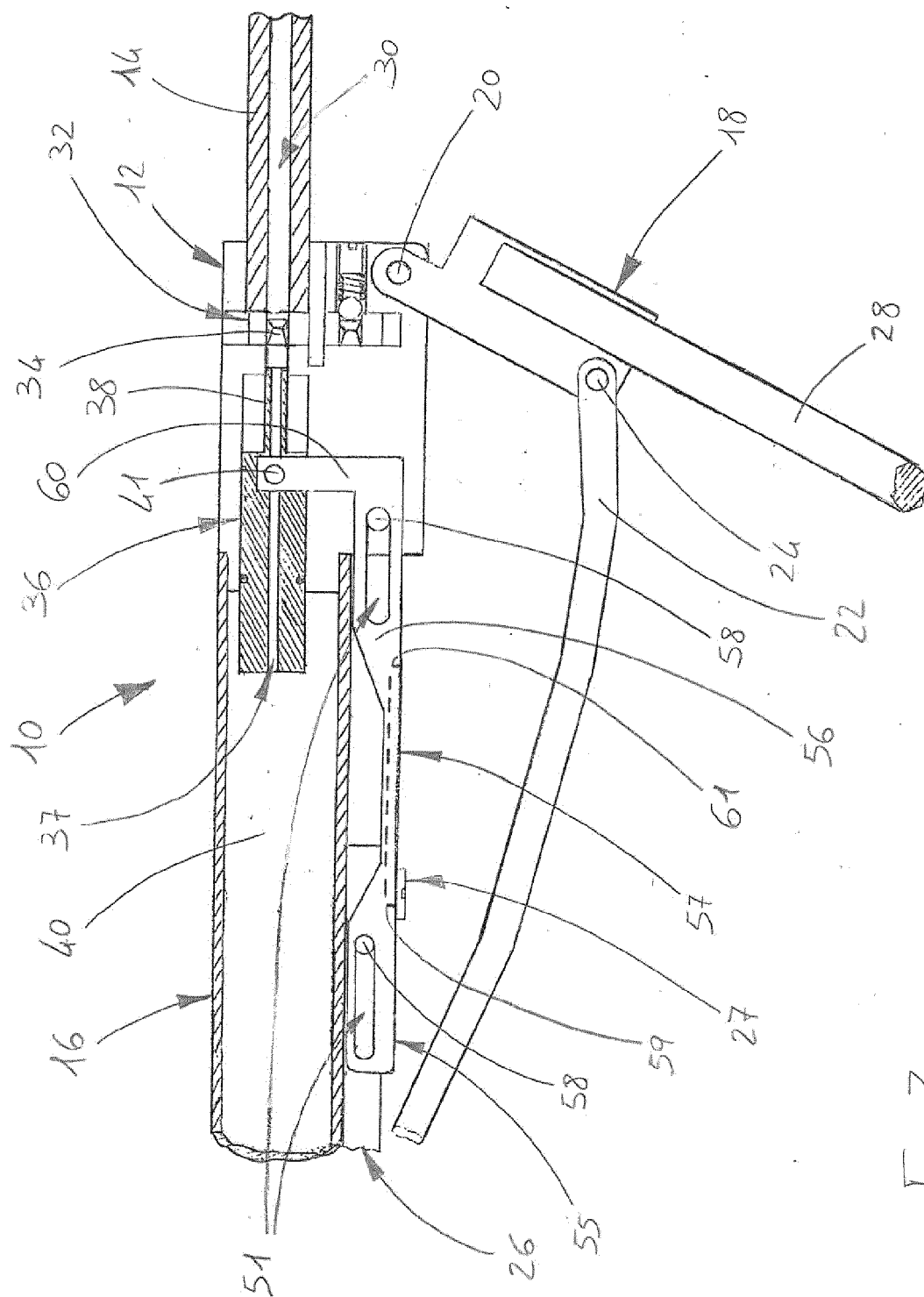
- a main body (12),
- a loader (32), adapted to contain at least a bullet (34) and movably mounted on the main body (12),
- a reservoir (16), adapted to contain the compressed air and fixed on the main body (12),

- a shot seat for said at least a bullet (34), adapted to receive said at least a bullet (34) when the bullet is hit by the compressed air at the time of the shot,
- a hollow shot barrel (14), fixed on the main body (12) and adapted to be traversed by the bullet (34),
- air compressing means (17), adapted to compress the air in the reservoir (16, 40),
- positioning means (36, 38, 42, 44, 46, 48, 52, 54) to position the at least a bullet (34), said positioning means being adapted to move the at least a bullet from the loader (32) to the shot seat (14, 30),
- control means (18, 20, 22, 24, 26, 27, 28, 29, 51, 55, 57, 58, 59, 61), connected to said compressing means (17),
- said control means (18, 20, 22, 24, 26, 27, 28, 29, 51, 55, 57, 58, 59, 61) being also connected to said positioning means (36, 38, 42, 44, 46, 48, 52, 54) so that both the compressing means (17) and the positioning means (36, 38, 42, 44, 46, 48, 52, 54) are actuated by actuating the control means (18, 20, 22, 24, 26, 27, 28, 29, 51, 55, 57, 58, 59, 61); **characterized by** the fact that the positioning means comprises a bolt (36), connected to the main body (12) so as to slide and provided with a pin (38), adapted to traverse the loader (32) in order to move said at least a bullet (34) from the loader (32) to the shot seat inside the hollow shot barrel (14).
2. Compressed air weapon (10) according to claim 2, wherein the positioning means comprises an oscillating element (42) which is connected to the main body (12) so as to rotate and which in turn comprises a first arm (46), adapted to make the loader (32) move and a second arm (48), coupled through coupling means (41, 50) with the bolt (36, 38) so that the oscillating element (42) rotates when the bolt (36, 38) translates.
 3. Compressed air weapon (10) according to claim 3, wherein the positioning means comprises a tooth (54) which is connected to the main body (12) so as to slide and wherein a U-shaped throat (52) is obtained in the first arm (46) and said tooth (54) is adapted to get in contact with the loader (32) so as to make it move and said U-shaped throat (52) is adapted to receive the tooth (54) so that a translation of the tooth (54) corresponds to a rotation of the first arm (46).
 4. Compressed air weapon (10) according to claim 3 or 4, wherein the control means comprises at least a carriage (26, 55), constrained to the main body (12) so as to slide and connected to the coupling means (41, 50).
 5. Compressed air weapon (10) according to any of claims 3 to 5, wherein the coupling means comprises an oblong hole (50), obtained in the second arm (48) of the oscillating element (42) and said oblong hole (50) receives a rivet (41) which is constrained to the bolt (36).
 6. Compressed air weapon (10) according to claim 7, wherein the control means comprises a first carriage (26) and a second carriage (55) which are connected to each other and both carriages are connected to the main body (12) so as to slide, a guide (57) forming a first stroke end (59) and a second stroke end (61) being obtained in said second carriage (55) and wherein the control means comprises also a screw (27), constrained to the first carriage (26), the second carriage (55) being constrained to the first carriage (26) so as to slide so that the screw (27) beats alternately against the first stroke end and the second stroke end so that the second carriage (55) is moved for a translation of a smaller width than the translation of the first carriage (26), the second carriage (55) being connected to the positioning means (36, 38, 42, 44, 46, 48, 52, 54).
 7. Compressed air weapon (10) according to claim 6 or 7, wherein the first carriage (26) is connected to the air compressing means (17) so that the compressing means (17) treats the air for at least a portion of the translation of the first carriage (26).
 8. Compressed air weapon (10) according to any of claims 6 to 8, wherein the control means comprises a lever (18, 28), hinged to the main body (12) and adapted to be rotated manually; the lever (18) is hinged to a connecting rod which in turn is hinged to the first carriage (26) so that the rotation of the lever (18) provokes at least a partial translation of the first carriage (26) and/or the second carriage (55).
 9. Compressed air weapon (10) according to any of the preceding claims, wherein the shot seat is in the inside of the shot barrel (14).

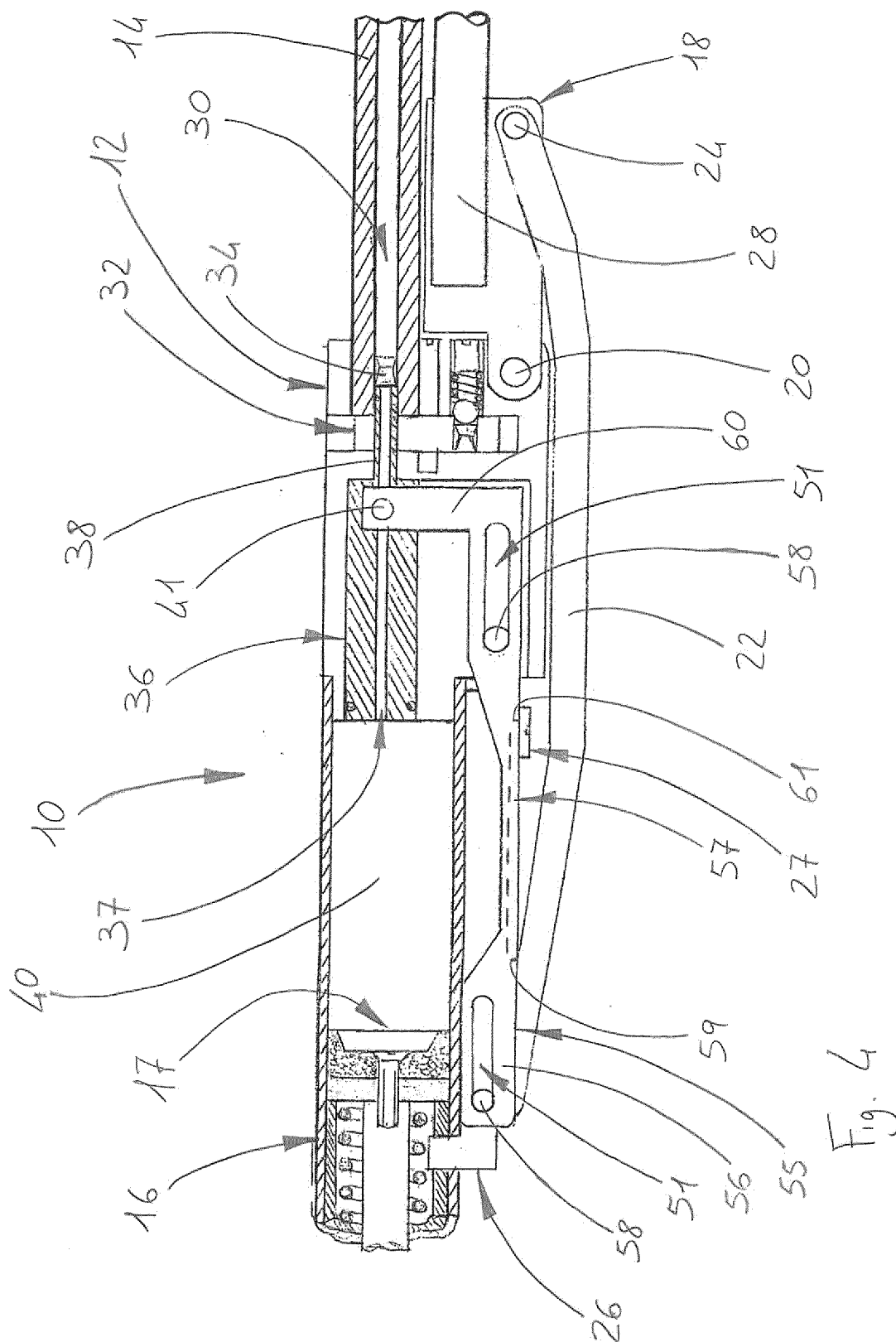




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EUROPEAN SEARCH REPORT

Application Number
EP 12 19 5788

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	FR 2 053 421 A1 (AZPITARTE ANASTASIO; AZPITARTE RAMON) 16 April 1971 (1971-04-16) * page 1, line 6 - line 9 * * figures *	1	INV. F41B11/642 F41B11/643 F41B11/647
X	BE 415 642 A (H SCHMEISSER) 20 May 1936 (1936-05-20) * page 5 * * figures *	1	
X	GB 2 206 500 A (FERRI GIAMPIERO) 11 January 1989 (1989-01-11) * abstract * * figures *	1	
X	FR 1 515 141 A (MM. PIERE POMMIER ET JEAN DESVAUD) 1 March 1968 (1968-03-01) * the whole document *	1	
X	FR 1 424 498 A (MILLARD BROTHERS LTD) 14 January 1966 (1966-01-14) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC)
A	US 5 666 937 A (MENDOZA-OROZCO HECTOR [MX]) 16 September 1997 (1997-09-16) * abstract * * figures *	1	F41B
A	US 2 572 176 A (FRANK MIHALYI) 23 October 1951 (1951-10-23) * column 3, line 3 - line 22 * * figures *	1	
A	EP 2 131 137 A1 (TOKYO MARUI CO LTD [JP]) 9 December 2009 (2009-12-09) * abstract *	1	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 February 2013	Examiner Vermander, Wim
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 19 5788

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14-02-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2053421	A1	16-04-1971	NONE
BE 415642	A	20-05-1936	NONE
GB 2206500	A	11-01-1989	DE 3820121 A1 29-12-1988 FR 2616350 A1 16-12-1988 GB 2206500 A 11-01-1989 IT 1217074 B 14-03-1990 US 4841655 A 27-06-1989
FR 1515141	A	01-03-1968	NONE
FR 1424498	A	14-01-1966	NONE
US 5666937	A	16-09-1997	NONE
US 2572176	A	23-10-1951	NONE
EP 2131137	A1	09-12-2009	CN 101657690 A 24-02-2010 EP 2131137 A1 09-12-2009 JP 4719807 B2 06-07-2011 US 2010043766 A1 25-02-2010 WO 2008114461 A1 25-09-2008

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- FR 2053421 A [0009]