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(54) SPRING DEVICE FOR FIREARM AND FIREARM

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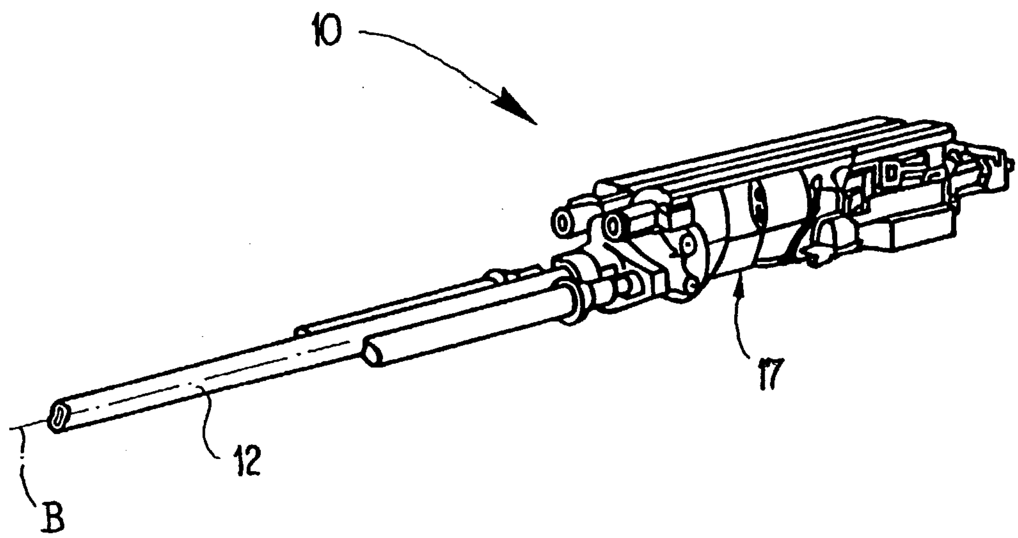
(57) **ABSTRACT**

A spring device for firearms (**10**) and a firearm are disclosed. The spring device is used for returning a first weapon part (**16**) of the firearm (**10**) from a second position into a first position, from which it has been brought into the second position in relation to a further weapon part (**11**) under an actuating force, while loading the spring device. The spring device has at least one gas spring having a piston/cylinder arrangement (**19**), a cylinder (**20**) of the piston/cylinder arrangement (**19**) being attachable to one of the weapon parts (**16; 11**) and a piston rod (**18**) of the piston/cylinder arrangement (**19**) being attachable to the other of the weapon parts (**11; 16**).



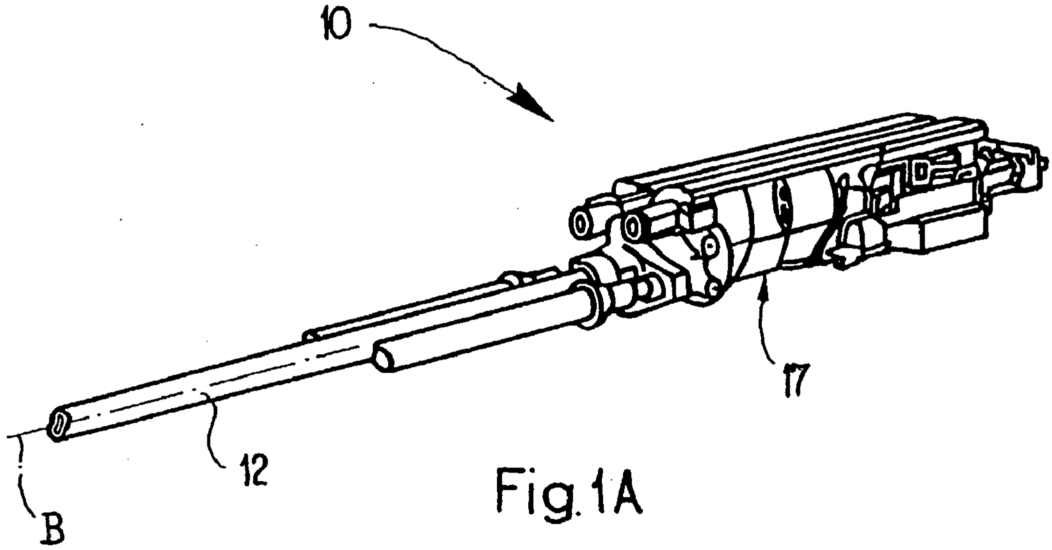


Fig.1A

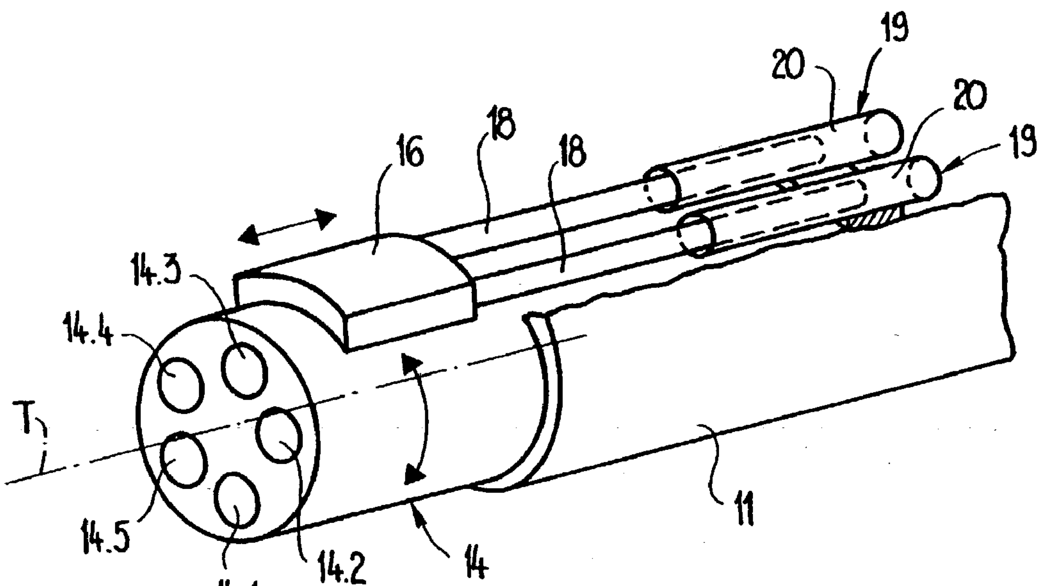


Fig.1B

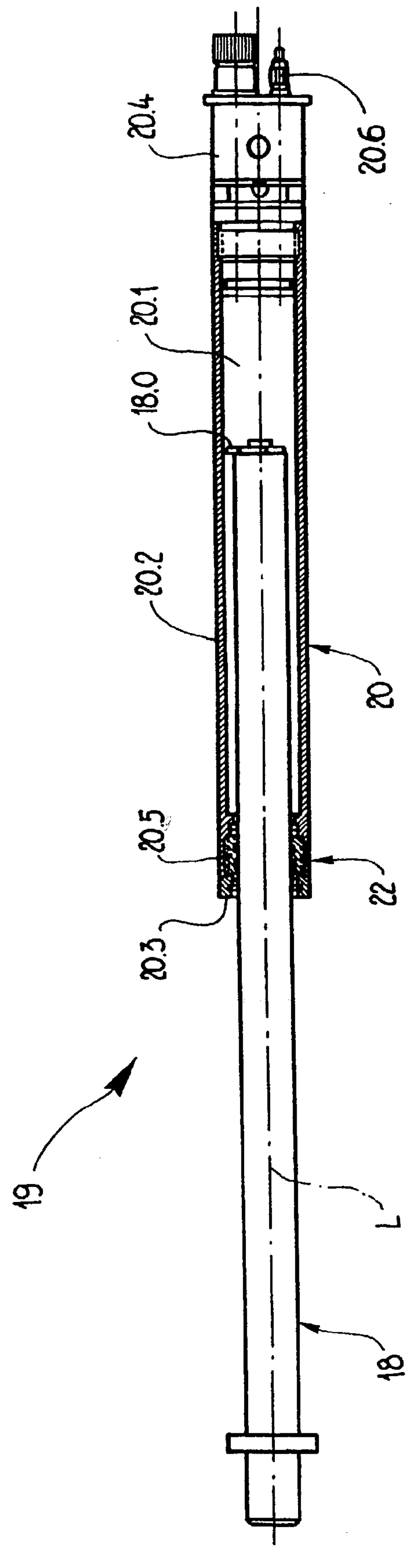


Fig.2

Fig. 3A

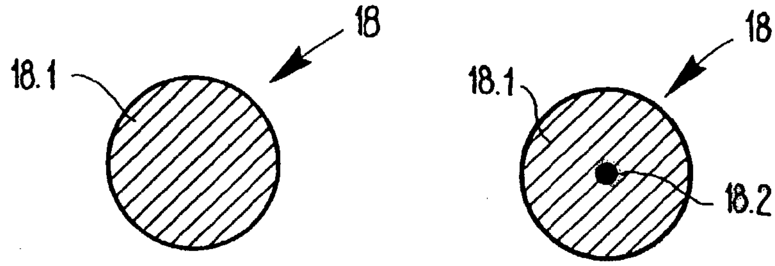


Fig. 3B

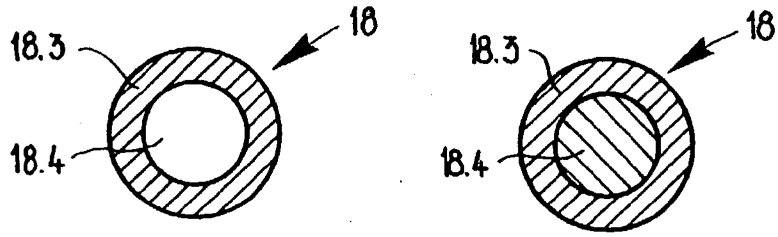


Fig. 3C

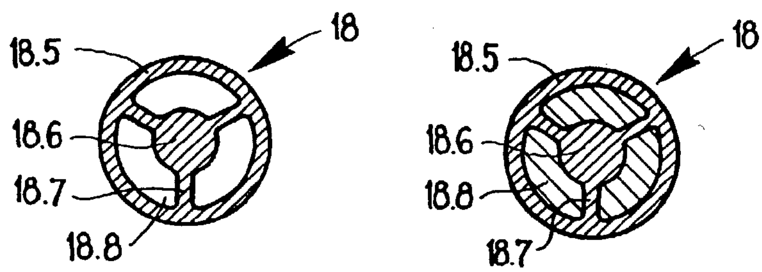


Fig. 3D

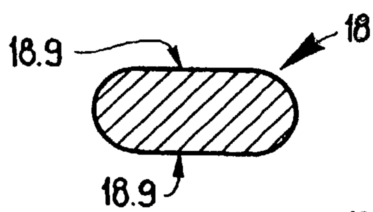


Fig. 3E

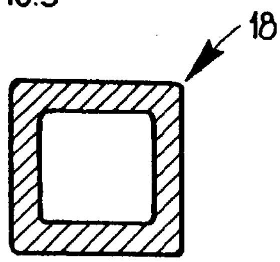


Fig. 3F

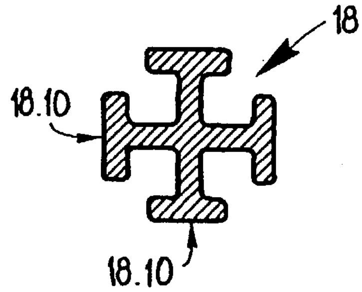


Fig.4A

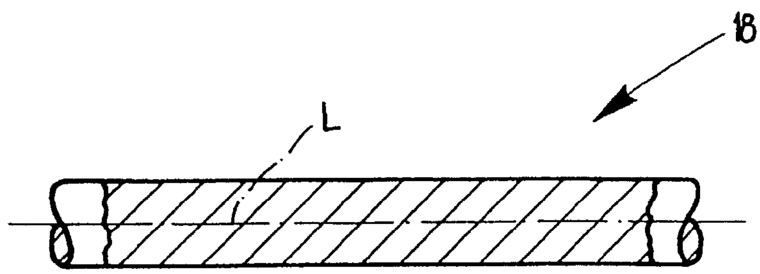


Fig.4B

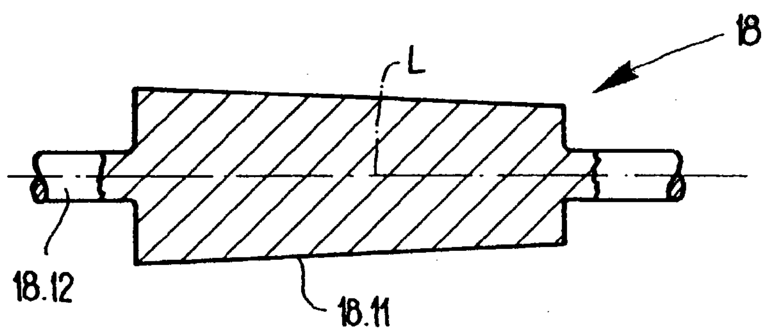


Fig.5

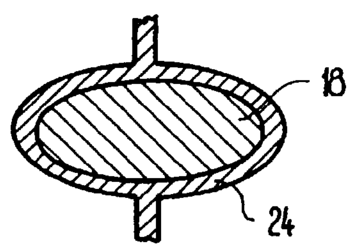


Fig.6A

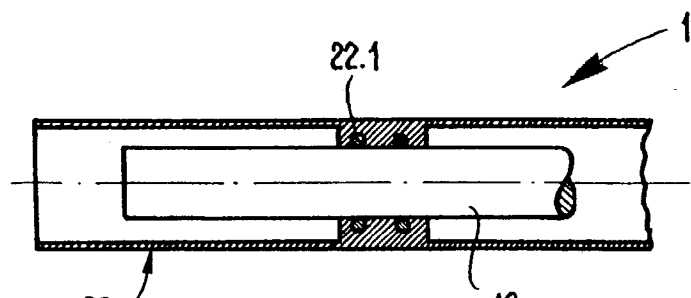
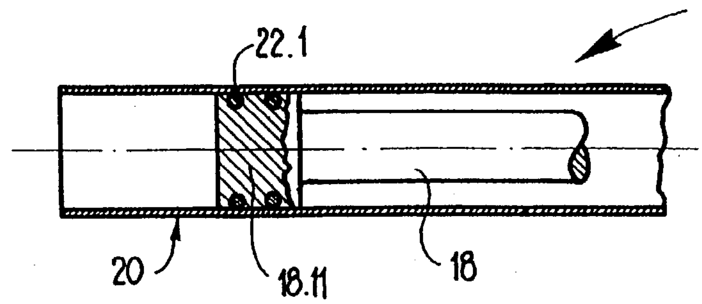


Fig.6B



SPRING DEVICE FOR FIREARM AND FIREARM

[0001] The present invention relates to a spring device for a firearm according to the preamble of claim **1** and a firearm having a spring device according to the preamble of claim **14**.

[0002] Spring devices of the type initially cited for and/or on firearms are essentially used for the purpose of returning a first, typically small weapon part, which is also referred to in the following as a moving part and which is brought, relative to a second, typically larger weapon part, out of a first position and/or starting position into a second position and/or final position, into its first position and/or starting position or supporting this return. The spring device used to return the moving part has at least one spring element. When the first weapon part and/or moving part is located in its starting position, it is either relaxed or slightly pre-tensioned, usually through shortening of the spring element. Through an actuating force, the first weapon part and/or moving part is moved from its starting position into its final position; this actuating force does not absolutely have to act during the entire movement, i.e., the first weapon part and/or moving part may also the set into motion through a brief pulse effect. The first weapon part and/or moving part attempts to move back into its starting position under the effect of the expanding spring elements.

[0003] The actuating force, through which the first weapon part and/or moving part is moved from its starting position into its final position, acts, for example, during loading of the firearm or when a part of the energy which becomes usable upon firing of a projectile is used to drive weapon parts for different weapon functions, for example, for drive using recoil or using propellant gases. In this case, the moving part displaces, generally translationally or with a translational component, in the direction of the bore axis of the weapon barrel of the firearm.

[0004] In a firearm which is fed the projectiles via a drum, i.e., in a revolver weapon, there is a translational movement of the first weapon part and/or moving part clocked and step-by-step in accordance with the cadence of the revolver weapon. The first weapon part and/or moving part acts as a drive and/or control element; by coupling the motion of the first weapon part and/or moving part to the drum, the drum is set into rotation. The first weapon part and/or moving part, which is implemented and active in such an arrangement as a slide valve for controlling processes on the weapon, moves in this case under an actuating force from a first position and/or starting position into a second position and/or final position; at the same time, the spring is tensioned. Subsequently, through the spring force or supported by the spring force, the first weapon part and/or moving part moves from its second position and/or final position back into its first position and/or starting position; the spring relaxes at the same time. In other types of firearms, which are not implemented as revolver weapons, the first weapon part and/or moving part may act in another way as a control and/or drive element.

[0005] The movement of the first moving part occurs highly dynamically, since the path of the moving part, which corresponds to the change in length of the spring element, is relatively long and the cadence of high-performance firearms, which determines the sequence of loading and relaxing of the spring elements, is high.

[0006] In order to increase the effect of weapons, increasing their cadence is generally desired. This requires that the masses of all moved weapon parts must be reduced and the rigidity of the typical mechanical spring elements must be elevated. It is obvious that the reduction of the masses of the moved weapon parts is particularly desirable, but also particularly difficult to achieve in weapons of medium and large caliber. A limit has now been reached with the current typical spring devices having mechanical spring elements, in regard to manufacturing technology for producing the spring elements and the function and service life of the spring devices, beyond which no further increase of the cadence is possible.

[0007] The object of the present invention is therefore,

[0008] to provide an improved spring device of the type initially cited, which is also suitable for firearms of medium and large caliber and higher cadences, the reliability and precision of the function and a high service life to be ensured, and

[0009] to provide a firearm having a spring device of this type.

[0010] This object is achieved according to the present invention

[0011] for the spring device by the features of the characterizing part of claim **1**; and

[0012] for the firearm by the features of the characterizing part of claim **14**.

[0013] Preferred refinements of the present invention are defined by the dependent claims.

[0014] The basic idea of the present invention is therefore to use new spring devices, whose spring elements are formed by gas springs, in place of typical spring devices having mechanical spring elements. Instead of the force of a pretensioned mechanical spring element, the pressure of a compressed gas on a piston in a cylinder of a piston/cylinder arrangement is used as the return force, which causes or supports the movement of the first weapon part and/or moving part in relation to the second weapon part from its second position and/or final position into the first position and/or starting position.

[0015] The cylinder of the piston/cylinder arrangement delimits, together with the piston, which is guided therein to form a seal, a space filled with a suitable gas, which may also be referred to as a pressure chamber. The pressure chamber is completely closed; i.e., it has no opening and/or at least no opening which may be opened during operation; if gas flows out of the pressure chamber during operation in spite of this, it is merely the smallest leakage quantities, which are, however, practically meaningless in relation to the quantity of the gas in the pressure chamber. The piston/cylinder arrangement may, however, have a sealable opening, which is only opened outside of operation, i.e., during assembly or for maintenance purposes, in order to add or remove gas. The mass of gas present in the pressure chamber during operation is, however, practically constant, i.e., the pressure chamber always contains the same quantity of the same gas and this gas is not replaced during operation; the volume of the pressure chamber and/or of the gas, and therefore the gas pressure in the pressure chamber, are changeable as a function of the position of the piston, the mass of the gas, however, remaining constant.

[0016] The most essential advantages which result from the use of spring devices having gas springs are as follows:

[0017] Gas springs having steeper force/displacement characteristics than mechanical spring elements may be produced, without their service life or the functionality of the spring devices being reduced in this way.

[0018] Spring devices having strong gas springs, particularly their moved parts, are lighter than functionally comparable spring devices having mechanical spring elements.

[0019] Gas springs have, in contrast to mechanical spring elements, spring characteristics which are adjustable and/or changeable in the course of time. This allows the spring devices to be tailored to different requirements and/or requirements which change in the course of time, without them having to be disassembled for this purpose.

[0020] In principle, the new spring device may be implemented in such a way that the first weapon part and/or moving part has its motion coupled either to the piston or to the cylinder. Since, however, the moving masses are to be as small as possible, an arrangement in which the first weapon part is coupled via a piston rod to the piston is preferred.

[0021] The gas springs used are generally implemented as pressure springs; the gas in the cylinder is compressed, while the weapon part referred to as the moving part moves from its starting position into its final position under an actuating force, and subsequently expands, through which the moving part is returned to starting position or the return of the moving part into its starting position is supported.

[0022] The moving part is displaced along a path which corresponds to the piston stroke of the piston/cylinder arrangement, and which essentially determines the minimum length of the piston rod; this path is relatively large. Depending on the function, keeping the masses of the moved parts and therefore also the masses of the piston rod as small as possible is to be sought, as already described, sufficient strength, in particular sufficient buckling stability and possibly high warping stability, having to be ensured; this is achieved by selecting a suitable material and/or through suitable shaping of the piston rod and/or through additional constructive measures during the mounting of the piston rod.

[0023] Particularly suitable piston rods are those whose cross-section has a higher moment of inertia than the cross-section of a complete piston rod, through which the buckling stiffness of the piston rod is improved. Piston rods having cross-sections which have one or more recesses in the region of the longitudinal axis of the piston rod are particularly favorable; in particular, hollow piston rods having the shape of oblong hollow cylinders are examples of these, since such piston rods are relatively easily producible and sealing problems, which will be described in more detail below, are easier to deal with for piston rods having cylindrical outer surfaces.

[0024] Piston rods having a high buckling stiffness, which are particularly suitable in the present case, are also obtained if a suitable material, in particular a material having a high modulus of elasticity, is used for this purpose.

[0025] Furthermore, bimetallic piston rods having a core made of a specific light material and a mantle made of a material having a high modulus of elasticity are particularly advantageous, the mantle, if it is made of a material having a high specific weight, preferably having the least possible wall thickness. Suitable combinations are, for example, aluminum for the core and steel for the mantle.

[0026] Piston rods may also be produced from other suitable materials, for example, from carbon, aramid, or other, possibly fiber-reinforced, materials.

[0027] It may also be advantageous to provide piston rods whose cross-section changes over their length, in such a way that strongly loaded length regions are implemented with cross-sections of higher strength than weakly loaded length regions. Care must be taken in this case that notching effects are avoided at the transition points between different cross-sections. Individual cross-sectional regions may be implemented as prismatic or tapered.

[0028] The piston rods may also be produced from multiple parts rigidly connected to one another in the longitudinal direction.

[0029] The danger of buckling and possibly warping which the piston rods are subject to may be reduced further if the piston rod is guided and/or supported around its circumference in at least some regions, inside and/or outside the cylinder. The guiding may be implemented by guide elements on the piston rod or, for example, on the cylinder.

[0030] The piston rod must be guided through the face of the cylinder on at least one end of the cylinder. Therefore, measures must be taken to seal the cylinder at the passage points of the piston rod. Suitable sealing and guiding arrangements are provided for this purpose, which take into account the comparatively rapid relative movement between cylinder and piston rod and which are also possibly suitable for a comparatively broad temperature range. Suitable sealing elements may be positioned either on the piston and/or on the piston rod or on the cylinder; in this case, the seal may be mounted in the cylinder or positioned and/or clamped between the cylinder and a cylinder head part screwed into the cylinder. It has been shown to be more favorable to mount the sealing elements on the cylinder. The reason for this is as follows: the surface which presses against the sealing elements and forms a sealing surface, and moves in relation to the sealing elements during loading and relaxing of the spring device, must be precisely machined and have a high surface quality, among other things a low surface roughness. In an arrangement having the sealing elements on the cylinder, this sealing surface is an outer surface, namely the outer surface of the piston rod, and the precise machining of an outer surface is known to be much less complicated than the precise machining of an inner surface.

[0031] Precise machining is to be understood to mean that the piston rods are to be precisely produced both in regard to their general shaping and in regard to their surface quality, so that the desired sealing effect may be implemented.

[0032] When selecting the materials used, the quality criteria described above must be taken more into consideration in the entire range of the environmental conditions, such as temperature, humidity, and other things.

[0033] It has been shown to be favorable and it increases the service life of the spring device if the piston rod and/or its mantle layer is produced from a corrosion-resistant material. Corrosion resistance helps to ensure the enduring strength and surface quality of the piston rod, permanent high surface quality being a condition for enduring efficiency of the sealing arrangement.

[0034] Even if the new spring device is implemented in such a way that there is an optimum seal between the cylinder and the piston rod, small losses of gas are to be expected in the course of time. It is therefore advantageous to provide the cylinder with a sealable connecting piece, via which gas may be introduced into the cylinder as needed, even in the mounted state.

[0035] As already mentioned, one of the advantages achieved when a spring device having a gas spring is used instead of a mechanical spring element is the possibility of changing the spring characteristic in a simple way; specifically, it is sufficient to elevate the quantity of gas in the cylinder in order to provide the gas spring with a steeper force/displacement characteristic. The connecting piece described above may therefore be used not only to introduce gas for the purpose of replacing gas which has escaped, but also to adjust the spring characteristic. It may be particularly advantageous to provide a pressure regulating device for this purpose.

[0036] Another possibility for influencing the spring characteristic is to change the compression ratio. For this purpose, the volume of the pressure chamber delimited by the cylinder is changed by introducing a solid body, for example a sleeve, or another, poorly compressible material, such as oil. Care is to be taken in this case that the movements of the piston rod are not interfered with.

[0037] The gas pressure in the cylinder is dependent on, among other things, the respective temperature. The temperature range in which the gas spring operates may be considerable, as already mentioned several times. It is therefore advantageous in certain cases to provide a compensation. In the event of permanently high temperatures or permanently low temperatures, the gas quantity in the cylinder may be reduced or elevated for this purpose. The connecting pieces described above may also be used for this purpose. For strongly varying temperatures, it is advantageous to provide a pressure regulating device which regulates the gas quantity as a function of the temperature in such a way that the pressure in the cylinder does not exceed and/or fall below certain limiting values.

[0038] In order to retrofit typical firearms, which have spring devices with mechanical spring elements, easily, the new spring devices having the gas springs may be conceived in such a way that they may be installed in place of the current spring devices, which are generally positioned in housings. Instead of the mechanical spring elements and their guide rods, piston/cylinder arrangements are installed into the housings for this purpose. In this case, insignificant or no adjustment work on the firearm is necessary, in particular, it is not necessary to completely disassemble the firearm.

[0039] In the following, the present invention is described in detail on the basis of a preferred exemplary embodiment and with reference to the drawing.

[0040] **FIG. 1A** shows a firearm implemented as a revolver pistol having a spring device according to the present invention in a simplified illustration in a diagram;

[0041] **FIG. 1B** shows a drum for a revolver pistol in a simplified illustration in a diagram;

[0042] **FIG. 2** shows a spring device according to the present invention in a section containing the longitudinal axis of a piston/cylinder arrangement;

[0043] **FIG. 3A** shows a first exemplary embodiment of a piston rod, in a section perpendicular to its longitudinal axis, a complete cross-section being illustrated in the left part of the figure and a cross-section having a bore with a smaller diameter being illustrated in the right part of the figure;

[0044] **FIG. 3B** shows a second exemplary embodiment of a piston rod, in a section perpendicular to its longitudinal axis, a hollow cross-section being illustrated in the left part of the figure and a cross-section having a core and a mantle layer being illustrated in the right part of the figure;

[0045] **FIG. 3C** shows a third exemplary embodiment of a piston rod, in a section perpendicular to its longitudinal axis, a cross-section having three longitudinal cavities being illustrated in the left part of the figure and a cross-section having three longitudinal cores being illustrated in the right part of the figure;

[0046] **FIG. 3D** shows a fourth exemplary embodiment of a piston rod, in a section perpendicular to its longitudinal axis;

[0047] **FIG. 3E** shows a fifth exemplary embodiment of a piston rod, in a section perpendicular to its longitudinal axis;

[0048] **FIG. 3F** shows a sixth exemplary embodiment of a piston rod, in a section perpendicular to its longitudinal axis;

[0049] **FIG. 4A** shows a piston rod, whose cross-section is constant over its length, in a section containing the longitudinal axis of the piston rod;

[0050] **FIG. 4B** shows a piston rod, whose cross-section is variable over its length, in a section containing the longitudinal axis of the piston rod;

[0051] **FIG. 5** shows a piston rod, which is guided on its outer surface to avoid buckling, in a section containing the longitudinal axis of the piston rod;

[0052] **FIG. 6A** shows a piston/cylinder arrangement having sealing elements on the cylinder; and

[0053] **FIG. 6B** shows a piston/cylinder arrangement having sealing elements on the piston.

[0054] Firearm **10** illustrated in **FIG. 1A, a** pistol, has a weapon barrel **12** having a bore axis B which is intended for the purpose of firing projectiles, supplied to it from a drum **14**, which forms a type of temporary storage for the projectiles. Drum **14** is surrounded by a housing **17** on firearm **10** and is therefore not visible in **FIG. 1A**.

[0055] **FIG. 1B** shows drum **14**, which is positioned in such a way that its axis of rotation T runs parallel to bore axis B of weapon barrel **12**; such an arrangement is, however, not required. Drum **14** contains a specific number n of channels, cartridge chambers, in the present case five cartridge chambers **14.1** to **14.5**, which are aligned coaxially to axis of rotation T and to bore axis B and are generally intended to receive one projectile each. The number of cartridge chambers does not have to be five; there are typically three to six cartridge chambers, but other numbers of cartridge chambers are possible.

[0056] Drum 14 is rotated cyclically around its axis of rotation T during firing, in such a way that it rotates by 360°/n after each shot, i.e., by 72° for five cartridge chambers. A first weapon part and/or moving part 16 is positioned on drum 14, which is movable relative thereto, and whose motion may be coupled to the motion of the drum 14; upon each rotation of drum 14, moving part 16 performs a translational movement in the direction of axis of rotation T, and upon each translational movement of moving part 16, drum 14 performs a rotation. First weapon part and/or moving part 16 moves translationally in this case relative to a second weapon part 11, which is only schematically indicated in **FIG. 1B**; second weapon part 11 is generally to be understood as a component of weapon 10.

[0057] The spring device according to the present invention may also be used if there is no conversion of a continuous rotational movement into a translational movement during the movement cycle, but rather, for example, the moving part may be coupled to a weapon part which is moved back and forth rotationally or also translationally.

[0058] Two piston rods 18 of piston/cylinder arrangements 19 and/or gas springs 19, one of which is illustrated in **FIG. 2**, are connected to moving part 16. The number of gas springs does not have to be two, arrangements having only one or more than two gas springs are also possible. Piston rod 18 projects into a cylinder 20 of piston/cylinder arrangements 19. The central longitudinal axis of piston/cylinder arrangement 19 is indicated with L. Each cylinder 20 contains a pressure chamber 20.1, sealable using a sealing and guiding arrangement 22, which is filled with a gas. The walls of cylinder 20 include a tube 20.2, a front face 20.3, and a rear wall 20.4. Front face 20.3 contains an insert 20.5 positioned in tube 20.2. Embodiments are also possible in which the functions of tube 20.2 and insert 20.5 are implemented jointly. Insert 20.5 has an opening for piston rod 18 and multiple sealing elements of a sealing arrangement 22. Rear wall 20.4 is attached in tube 20.2 to form a seal, but may be removed. Rear wall 20.4 has an opening having an openable connecting piece 20.6, through which gas may be introduced into pressure chamber 20.1 and/or removed therefrom during assembly or for maintenance purposes. The external diameters of piston rod 18, and therefore of the opening in insert 20.5, have significantly smaller transverse dimensions than the internal diameter of tube 20.2, therefore, piston rod 18 is secured against sliding out of cylinder 20 by a projection 18.0 positioned on its back end.

[0059] Piston/cylinder arrangement 19 forms, as already described, a gas spring of a spring arrangement, the entire spring arrangement able to have one or more gas springs, generally connected in parallel. The mode of operation of piston/cylinder arrangement 19 and/or of the gas spring is described in the following: while moving part 16 performs its translational movement during a rotation of drum 14 by 360°/n, and thus moves from a starting position into a final position, piston rod 18, whose movement is coupled to moving part 16, displaces piston/cylinder arrangement 19 into cylinder 20, which has the consequence that the volume of pressure chamber 20.1 is reduced and the gas pressure in pressure chamber 20.1 increases. The compressed gas in pressure chamber 20.1 exerts a force on piston rod 18, which allows or supports its return from the final position into the starting position. If piston rod 18 has reached at starting position again, a movement cycle is ended and the sequence of processes just described begins anew, until the firing is interrupted.

[0060] Piston rod 18 has, like all weapon parts moved cyclically during firing, the smallest possible mass. In order to achieve this, the cross-sectional surfaces of the piston rod and the density of the materials used must be as small as possible for a given piston stroke and/or a given length of piston rod 18. In spite of this, piston rod 18 must be implemented in regard to its dimensions and the materials used in such a way that it has sufficient strength and, in particular, sufficient buckling stability and possibly warping stability. Suitable cross-sections of piston rods 18 are illustrated in **FIGS. 3A** to 3F.

[0061] **FIG. 3A** shows a piston rod 18 on the left having a circular cross-section, which is produced from one single material. Alternatively, such a piston rod may have a mantle 18.1, preferably made of a material of higher strength and rigidity, and a core 18.2, which has a smaller diameter in this case, made of a material of lower strength and density, the bonding of the materials and the shaping of the piston rod 18 being implemented through compression, sintering, spray molding, or another suitable manufacturing method which guarantees a sufficiently strong bond between the different materials.

[0062] On the left, **FIG. 3B** shows a piston rod 18 having a relatively thin-walled mantle 18.3 and a longitudinal cavity 18.4; such a cross-section has a larger geometrical moment of inertia for the same cross-sectional area than a complete cross-section and is therefore more resistant to bending and buckling. On the right, a piston rod 18 is illustrated, having mantle and/or mantle layer 18.3 with a circular cross-section and a relatively large-diameter core 18.4, which preferably has a lower density than mantle 18.3.

[0063] A further piston rod 18 is illustrated in **FIG. 3**C, which has a mantle 18.5, a core 18.6, and webs 18.7, which connect the mantle and the core. Spaces 18.8 between mantle 18.5, core 18.6, and webs 18.7 may, as illustrated in the left part of the figure, form three longitudinal cavities; they may also, as illustrated in the right part of the figure, be filled with three longitudinal cores made of a material which preferably has a lower density than the material of mantle 18.5, core 18.6, and webs 18.7.

[0064] **FIG. 3D** shows a further piston rod 18 having an at least approximately oval cross-section, which may also have flat cross-sectional areas 18.9. Such a piston rod 18 may be guided from the outside along these flat cross-sectional areas 18.9.

[0065] A piston rod 18, which is hollow and whose cross-section is essentially delimited in a straight line, is illustrated in **FIG. 3E**.

[0066] **FIG. 3F** shows a piston rod 18 having a cross-section like a Maltese cross, which has a relatively high geometrical moment of inertia and flat surfaces 18.10, along which piston rod 18 may be guided.

[0067] **FIG. 4A** shows a piston rod 18 in a section containing longitudinal axis L. This piston rod 18 is implemented as prismatic; if the cross-sectional surface has a circular edge, such a piston rod 18 is cylindrical on the outside.

[0068] **FIG. 4B** illustrates a further piston rod **18** in a section containing longitudinal axis L, which is, however, not implemented as prismatic, but rather, in accordance with the respective load, as regions **18.11** having larger cross-sections and regions **18.12** having smaller cross-sections. The individual regions may be implemented as prismatic or tapering.

[0069] In **FIG. 5, a** piston rod **18** is shown, which has an approximately oval cross-section. A guide device **24** is also illustrated, which is used to guide piston rod **18** on all sides.

[0070] In piston/cylinder arrangement **19** illustrated in **FIG. 2**, as described above and schematically illustrated again in **FIG. 6**A, sealing arrangement **22** is implemented in such a way that sealing elements **22.1** are attached in cylinder **20**. However, it is also possible, as illustrated in **FIG. 6**B, to position sealing elements **22.1** on the inner end region of piston rod **18**, which forms an actual piston **18.11**.

What is claimed is:

1. A spring device for firearms, for returning a first weapon part of the firearm from a second position into a first position, from which it has been brought under an actuating force into the second position in relation to a further weapon part while loading the spring device,

characterized in that the spring device has at least one gas spring having a piston/cylinder arrangement, a cylinder of the piston/cylinder arrangement being attachable to one of the weapon parts and a piston rod of the piston/cylinder arrangement being attachable on the other of the weapon parts.

2. The spring device according to claim 1,

characterized in that the piston rod is attachable to the first weapon part, which is implemented as a moving part.

3. The spring device according to claim 1,

characterized in that the gas spring is a pressure spring.

4. The spring device according to one of claims 1 to 3,

characterized in that the piston rod has a high buckling stability and possibly a high warping stability.

5. The spring device according to one of claims 1 to 4,

characterized in that the cross-section of the piston rod has a high geometrical moment of inertia for a given cross-sectional area.

6. The spring device according to one of claims 1 to 5,

characterized in that at least one mantle layer of the piston rod is produced from a material having a high modulus of elasticity.

7. The spring device according to one of claims 1 to 6,

characterized in that the piston rod is produced from a material combination, for example a bimetallic combination, a core being produced from a light material, for example, aluminum, and a mantle being produced from a material having a high modulus of elasticity.

8. The spring device according to one of claims 1 to 7,

characterized in that the outer surface of the piston rod has low surface roughness and/or good corrosion resistance.

9. The spring device according to one of claims 1 to 8,

characterized in that the cross-section of the piston rod is changeable over its length in accordance with the respective cross-sectional load, transitions between different cross-sections preferably being designed without-notching effects.

10. The spring device according to one of claims 1 to 9,

characterized in that the piston rod is guided and/or supported transverse to its longitudinal axis by guide bodies in at least some regions, in order to prevent buckling of the piston rod.

11. The spring device according to one of claims 1 to 10,

characterized in that the piston/cylinder arrangement **(19)** has a sealing and possibly guiding arrangement, having at least one sealing element, which is positioned on a piston of the piston rod or on a face of the cylinder, through which the piston rod is guided.

12. The spring device according to one of claims 1 to 11,

characterized in that the cylinder has a connecting piece, preferably positioned in its end surface, which is implemented for supplying or removing gas to or from, respectively, the pressure chamber.

13. The spring device according to one of claims 1 to 12,

characterized in that a regulating device is provided, through which the pressure in the pressure chamber may be kept within predetermined limiting values, in order to replace escaped gas and/or to achieve temperature compensation.

14. A firearm having a spring device, which is implemented for the purpose of returning a first weapon part from a second position into a first position, it having been brought into the second position relative to a second weapon part while loading at least one spring element of the spring device,

characterized in that the spring device has a gas spring having a piston/cylinder arrangement as a spring element.

15. The firearm according to claim 14,

characterized in that it has a further device, which works together with the spring device, for returning the first weapon part.

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