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(71) Hakija - Sökande - Applicant

1• Sako Oy , Sakonkatu 2 , 11100 Riihimäki , (FI)

(72) Keksijä - Uppfinnare - Inventor

1• SAARENKANTA , Simo , Iittala , (FI)
2• SCHRÖDL , Christoph , Porvoo , (FI)

(74) Asiamies - Ombud - Agent

Berggren Oy , P.O. Box 16 Eteläinen Rautatiekatu 10 A , 00101 Helsinki

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Aseen äänenvaimennin

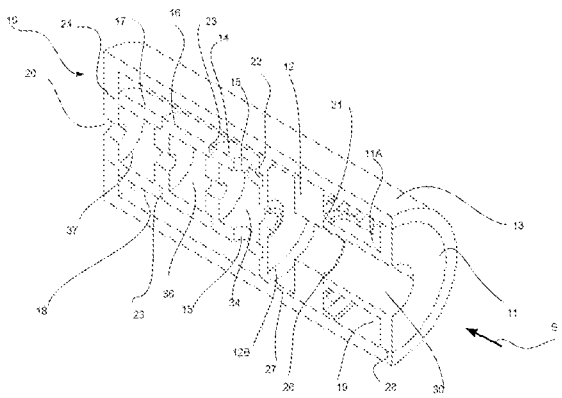
Ljuddämpare för vapen

Firearm suppressor

(57) Tiivistelmä - Sammandrag - Abstract

Keksinnön kohteena on aseen äänenvaimennin, jolla äänenvaimentimella (10) on olennaisesti pyörähdyssymmetrinen sylinterimäinen muoto ja joka käsittää äänenvaimenninkotelon (13), takapäätykannen (11), useita kammioita (18, 19, 25, 34, 36, 37) palamiskaasujen laajenemista ja polttamista varten ja järjestettynä äänenvaimenninkotelon (13) sisäpuolelle, piippuaukon (30), poistumisaukon (20) projektiilia varten ja jatkuvan kanavan äänenvaimentimen (10) pyörähdyssymmetrisen sylinterimäisen muodon kuvitteellista keskiakselia pitkin piippuaukosta (30) aseesta ammuttavaksi sovitetun projektiilin poistumisaukkoon (20). Äänenvaimennin (10) käsittää tukirungon (12) kiinnitettynä äänenvaimenninkoteloon (13) avattavalla tukiliitoksella (27). Äänenvaimennin (10) edelleen käsittää baffeleita (14, 16, 17) sijoitettuna tukirungon (12) ja äänenvaimentimen (10) etupäädyn väliin ja äänenvaimennin (10) edelleen käsittää muotosovitteiset, avattavat liitokset (23) baffeleiden (14, 16, 17) kiinnittämiseksi sen viereiseen/-siin baffeliin/-leihin. Keksinnön kohteena on myös ase, joka käsittää äänenvaimentimen.

The invention relates to a firearm suppressor which suppressor (10) has a substantially rotationally symmetrical cylindrical form and comprises a suppressor housing (13), a rear end cap (11), a plurality of chambers (18, 19, 25, 34, 36, 37) for expansion and burning of propellant gases and arranged inside the suppressor housing (13), a barrel opening (30), an outlet opening (20) for a projectile and a continuous channel along an imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor (10) from the barrel opening (30) to the outlet opening (20) for the projectile configured to be fired by the firearm. The suppressor (10) comprises a support frame (12) attached to the suppressor housing (13) by a reopenable support joint (27). The suppressor (10) further comprises the baffles (14, 16, 17) located between the support frame (12) and the front end of the suppressor (10) and the suppressor further comprises form-fitting, reopenable joints (23) to attach the baffles (14, 16, 17) to adjacent baffle/-s thereof. The invention also relates to a firearm comprising a suppressor.



Firearm suppressor

Technical field

The present invention relates to suppressors for firearms. More precisely the present invention relates to a firearm suppressor according to the preamble part of claim 1. The present invention also relates to a firearm comprising a suppressor.

Background

The noise generation in a firearm shot has three main components: muzzle blast, sonic boom and the mechanical action. In the field of noise and flash reduction of firearms has been presented quite many different constructions and devices for the same purpose i.e. to dampen the noise and flash caused by the rapid burning of propellants when the firearm is fired. As the benefits of this reduction are quite obvious, the noise of undamped firearm may exceed 140 dB, even 160 dB, and can be harmful for firearm users or anyone nearby and disturb large surrounding areas, for example by a hunting area or by a shooting range. It is also preferred to be avoided or at least minimized in military applications where the sound of the firing immediately attracts the attention of parties concerned. The better the suppressor is in terms of noise reduction and if combined to easy or simple manufacturability and to low weight, the better the suppressor is in terms of commercial interest.

A firearm bullet or in general a projectile, is rapidly accelerated at firing to an initial velocity depending on the type of the firearm. The initial velocity means here the velocity of the projectile when exiting the barrel or corresponding part of a firearm. This means that the initial velocity may be within range on about 0,8 to 3,3 Mach (where 1 Mach is the speed of the sound when the medium is normal atmospheric air in about normal temperature and pressure (ntp). Thus, the flow dynamics range concerned may vary from slightly subsonic to highly supersonic flows.

In case of supersonic noise dampening, the suppressor is not capable of reducing the noise originating from the projectile breaking the sound barrier during the flight to a destination. Thus, the aim of the suppressor is to reduce as much as possible the noise generated by the muzzle blast i.e. the phase when the projectile is no longer in front of that high pressure propellant gas and the pressure is rapidly normalizing to an atmospheric pressure, the burning propellant is exiting the barrel and when the propellant residuals are burning outside the barrel. Without any kind of muzzle suppressor device, the propellant gases will expand violently to the atmosphere and produce noise. The main operating principle of the suppressor is to provide a controlled volume to allow the gas to expand into, and preferably burn out. Thus, when the projectile exits the barrel, the muzzle blast is significantly reduced as the burning propellant is contained in a closed volume. The regular suppressors are basically formed as a closed structure as long as the projectile is inside the suppressor, which causes excess back pressure. A flow-through suppressor allows the gas to pass through the suppressor so that the back-pressure increase is eliminated or at least minimized.

As known, the firearm suppressors are typically removable attached to the ends of firearm barrels. Thus, weight of a firearm suppressor is a matter to be taken in account, when designing firearm suppressors, for example a very heavy suppressor may cause difficulties in operation of it with the firearm due to the weight causing a change in center of gravity. An important factor of the suppressor weight as attached at the end of the barrel is also that the suppressor affects to the shooting properties of the firearm and also increases the overall weight of the firearm in use.

The firearm suppressors are also typically designed for a certain type of a firearm and for a certain caliber. Thus, a great variety of suppressors are needed for different types of firearms and different types of ammunition calibers. This causes increased manufacturing, storing etc. costs.

The objective of the present invention is to provide a firearm suppressor capable of reducing a significant amount of noise caused by the firing of a firearm.

One objective is also to provide a suppressor construction, which is capable of producing an effective flow loss i.e. consume the flow energy inside the suppressor to different losses and thus reducing the noise caused by sudden eruption of propellant gases.

One objective is also to enable the residual burning of the propellant gas still containing some unburned propellants within the suppressor housing, thus diminishing the noise effect of suddenly burning residuals outside the barrel.

One objective is further to create an improved firearm suppressor, by which the above-described problems and disadvantages relating to known suppressors are eliminated or at least minimized.

Yet, an objective is to create an improved firearm suppressor, in which the noise eliminating properties in relation to the weight of the suppressor are optimized.

Also, an objective is to provide an improved suppressor, especially in view of its capability of burning propellant gases, its weight and its manufacturing and assembly effectivity.

Summary

In order to achieve the above objects and those that will come apparent later the firearm suppressor, is mainly characterized by the features of the characterizing part of claim 1.

Dependent claims present advantageous features and embodiments of the invention.

According to the invention the firearm suppressor has a substantially rotationally symmetrical cylindrical form and comprises a suppressor housing, a rear end cap, a plurality of chambers for expansion and burning of propellant gases and arranged inside the suppressor housing, a barrel opening, an outlet opening for a projectile and a continuous channel along an imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor from the

barrel opening to the outlet opening for the projectile configured to be fired by the firearm, wherein the suppressor comprises a support frame attached to the suppressor housing by a reopenable support joint (force-fit joint), the suppressor further comprises the baffles located between the support frame and the front end of the suppressor, and the suppressor further comprises form-fitting, reopenable joints to attach the baffles to adjacent baffle/-s thereof.

According to an advantageous feature the baffles comprise a first baffle, at least one center baffle and an end baffle and the first baffle of the baffles is joined to the support frame by a form-fitting reopenable joint, the form-fitting reopenable joints attach the center baffle/-s to the adjacent baffles and the end baffle is attached to the suppressor housing by a form-fitting, reopenable joint. By means of the number of the center baffles the amount of sound suppression can be controlled.

According to an advantageous feature the suppressor comprises a front chamber formed inside the support frame.

According to an advantageous feature the suppressor has a modular structure.

According to an advantageous feature the suppressor comprises the first, center and end baffles located between the support frame and the front end of the suppressor, the first baffle is joined to the support frame by a reopenable joint, reopenable joints attach the center baffle/-s to adjacent baffles and that the end baffle is attached to the suppressor housing by a reopenable joint. The first, center and end baffles are preferably U- or M-shaped forming correspondingly shaped baffle chambers and the arms of the U- or M-shape extend backwards in the suppressor. The end baffle is located inside the front end of the suppressor housing and the suppressor comprises an outlet opening for the projectile in the end baffle..

According to an advantageous feature the form-fitting, reopenable joints may have similar or different dimensions and shapes depending on the requirements of the joint. Preferably, the joints attach the respective parts together by the pressing force effecting in the joint. For example shoulder-groove joints can be used. Especially advantageous are also tapered joints and wedge-shaped joints, by which controlling of loads is improved. In case of

the tapered or wedge-shaped joints the inclined surfaces form a self-retaining surface towards the outer circumference of the suppressor.

According to an advantageous feature the rear end cap is located at the back end of the suppressor and attached inside the suppressor housing by a reopenable attachment between the suppressor housing and the rear end cap, the support frame is attached to the rear end cap by a reopenable joint between the rear end cap and the support frame. The rear end cap advantageously extends partially inside the support frame. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment.

According to an advantageous feature the first baffle comprises flow holes around its perimeter. Alternatively a perforated tube-like first baffle can be used.

According to an advantageous aspect the amount and size of the flow holes in the first baffle is optimized such, that simultaneously required load resistance and maximized flow capacity is provided. Advantageously, the open area is at least 50 %, more advantageously at least 80 % of the circumferential surface area of the first baffle.

According to an advantageous feature between the outer circumference of the baffles and the inner circumference of the suppressor housing a perimeter chamber is formed.

According to an advantageous feature the propellant gases are configured to be guided through the flow holes to the perimeter chamber.

According to an advantageous feature the suppressor housing is formed of one substantially U-shaped uniform part.

According to an advantageous feature the suppressor housing has an opening at closed end of the U-shape and that open end of the U-shape has an inner reopenable attachment for attachment of the rear end cap with the barrel opening. The inner reopenable attachment may be a thread attachment, a

locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment.

According to an advantageous aspect the firearm suppressor is assembled such, that first inside the suppressor housing the end baffle is mounted and thereafter the center baffle/-s and then the first baffle. In further assembly the support frame is mounted and then the rear end cap.

According to an advantageous aspect the firearm suppressor has a modular structure. For suppressors for different types of firearms and different calibers several parts can be used as common parts. Additionally the modular structure is easily modifiable based on firearm types, i.e. for example conventional versions of firearm suppressors functioning as from the thread of the barrel frontwards extending types and overbarrel versions of firearm suppressors functioning as from the opening of the barrel frontwards and backwards extending types may and fixed versions attached directly to the barrel around it and possibly frontwards extending may have common type designed parts and elements. For example overbarrel type firearm suppressors can have as common parts the suppressor housing and the rear end cap as well as seals used in the construction. The conventional types of firearm suppressors can have as common parts the suppressor housing and the rear end cap as well as seals used in the construction and in respect of the barrel thread and/or caliber variating part the first baffle is constructed. For example baffles and/or seals can also be constructed in respect of caliber. Thus, suppressors for different types of firearms and different calibers are easily modifiable and producible in accordance with the need.

According to an advantageous aspect the support frame is made of material, which has required strength in view of the caliber, has as low as possible density, endures the heat and chemical strain of the propellant gases. Thus, advantageous material choices are titanium and its compositions, stainless steel and its special alloy options, aluminum compositions, as well as plastic and composite materials. For example density of titanium is about 4430kg/m^3, density of aluminium compositions is in 6000/7000-serietypes 2680kg/m^3 - 2810kg/m^3 density of steels is generally 7750kg/m^3 – 8050kg/m^3 and density of plastic materials is 900kg/m^3- 1300kg/m^3.

By the suppressor according to the invention and its advantageous features many advantages are achieved: The firearm suppressor is capable of reducing a significant amount of noise caused by the firing of a firearm. The firearm suppressor construction is capable of producing an effective flow loss i.e. consume the flow energy inside the suppressor to different losses and thus reducing the noise caused by the sudden eruption of propellant gases. The improved firearm suppressor has optimized the noise eliminating properties in relation to the weight of the suppressor. The assembly work of the suppressor is simple, easy and fast. Also, improved cost-efficiency is achieved through the modular construction as higher volume of same parts can be utilized in the production of the different types and for different calibers of firearms.

Brief description of the drawings

In the following the invention and its advantages are explained in greater detail below in the sense of example and with reference to accompanying drawing, in which

In figure 1 is schematically shown an advantageous example of a suppressor of a firearm.

In figure 2 is schematically shown the advantageous example of figure 1 as a 3D drawing.

In figure 3 is schematically shown another advantageous example of a suppressor of a firearm.

In figure 4 is schematically shown the advantageous example of figure 3 as a 3D drawing.

In figure 5 is schematically shown yet another advantageous example of a suppressor of a firearm.

In figure 6 is schematically shown the advantageous example of figure 5 as a 3D drawing.

In figure 7 is schematically shown a further advantageous example of a suppressor of a firearm.

In figure 8 is schematically shown the advantageous example of figure 7 as a 3D drawing.

In figures 9A-9B is schematically shown an advantageous example of a support element of a suppressor of a firearm.

Detailed description

During the course of the following description like numbers and signs will be used to identify like elements according to the different views which illustrate the invention and its advantageous examples. In the figures some repetitive reference signs may have been omitted for clarity reasons.

In figures 1-2 is schematically shown an example of the suppressor 10 comprising a suppressor housing 13 defining the outer surface of the suppressor 10. The suppressor housing 13 is formed of one substantially U-shaped uniform part, which has an opening at closed end of the U-shape and open end of the U-shape has an inner reopenable attachment 28 for attachment of a rear end cap 11 with the barrel opening 30. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The travel direction of a projectile in the suppressor 10 is along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from left to right in the figure 1 and from right to left in the figure 2. Inside the suppressor 10 and the suppressor housing 13 is arranged a number of compartments configured to allow the gas to expand into and to burn out. The suppressor housing 13 comprises reopenable attachments 27, 28 for a support frame 12 attached to the suppressor housing 13 by a reopenable support joint (force-fit joint) 27 and the rear end cap 11. At one end of the suppressor 10, at

the back end of the suppressor 10, in the figure 1 at the left end and in the figure 2 at the right end, the suppressor 10 comprises the barrel opening 30 for a barrel of a firearm. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The suppressor 10 is attached to the front end of the barrel by a direct thread 26 for the barrel. Instead of the direct thread 26 also an interchangeable thread tubing/-s for different barrel thread sizes can be used. At another end of the suppressor 10, at the front end of the suppressor 10, in the figure 1 at the right end and in the figure 2 at the left end, the suppressor 10 comprises an outlet opening 20 for the projectile in an end baffle 17. A continuous channel for the projectile is formed along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from the barrel opening 30 to the outlet opening 20 for the projectile. Thus, the barrel opening 30 for the projectile to pass through the suppressor 10 extends through the suppressor 10 along the imaginary center axis of the suppressor 10.

The suppressor 10 comprises the rear end cap 11 at the back end of the suppressor 10 attached by the reopenable attachment 28 inside the suppressor housing 13. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. In this example the rear end cap 11 extends as an extended part 11A a distance inside the suppressor housing 13 and a space 19, a rear chamber 19 is formed between the outer circumference of the end cap 11 and the inner circumference of the suppressor housing 13. The support frame 12 is attached to the rear end cap 11 by a joint 21 between the rear end cap 11 and the support frame 12 located at the front end of the extended part 11A of the rear end cap and inside the suppressor housing 13 via the reopenable attachment 27 between the suppressor housing 13 and the support frame 12. The rear end cap 11 extends partially inside the support frame 12. The suppressor 10 also comprises seals (not shown) between the parts and elements for ensuring a tight and gas-sealed construction, where needed.

The support frame 12 has in this example a deflector surface 12B providing improved filling and improved expansion of the gases and thus, improved noise suppression. The barrel does not extend the full length of the barrel

opening 30 as shown in the figure by line 30E indicating the end of the barrel in the barrel opening 30, but instead a clearance is provided between the end of the barrel 30E. This provides improved turning of the propellant gases. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces for example by welding.

The support frame 12 is attached by the reopenable attachment 27 extending to substantially whole length of the support frame 12 to the inner circumferential surface of the suppressor housing 13 between the rear chamber 19 and the perimeter chamber 18 in this example. Thus, improved balance of the suppressor is provided as the center of gravity is close to the attachment point and supporting the suppressor structure and dividing loads more equally within the suppressor. The support frame 12 is configured to receive and distribute the loads effecting in the suppressor 10 and provides a self-supporting suppressor 10, as well as provides protection against heat and chemical effects of the propellant gases. The support frame 12 always supports the structural integrity of the suppressor 10 by taking up heaviest pressures and temperatures. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces, for example by welding.

The support frame is made of material, which has required strength in view of the caliber, has as low as possible density, endures the heat and chemical strain of the propellant gases. Thus, advantageous material choices are titanium and its compositions, stainless steel and its special alloy options, aluminum compositions, as well as plastic and composite materials. For example density of titanium is about 4430kg/m^3, density of aluminium compositions is in 6000/7000-serietypes 2680kg/m^3 - 2810kg/m^3 density of steels is generally 7750kg/m^3 – 8050kg/m^3 and density of plastic materials is 900kg/m^3- 1300kg/m^3. . Especially in respect of the location of the support frame 12 in the suppressor 10 being most sensitive titanium may be considered very advantageous material choice.

The suppressor 10 further comprises the first, center and end baffles 14, 16, 17 located between the support frame 12 and the front end of the suppressor 10. The first baffle 14 may also be located to a non-first position, and thus the locations of the first baffle 14 and the center baffle 16 may be different than

the one presented in the figure. The end baffle 17 is located inside the front end of the suppressor housing 13 and the suppressor 10 comprises an outlet opening 20 for the projectile in the end baffle 17.. Next to the support frame 12 is located a first baffle 14 comprising flow holes 15 around its perimeter and thereafter at least one center baffle 16, the example of the figure comprises one center baffle 16 and an end baffle 17 are located. Through the flow holes 15 the propellant gases are guided effectively to the perimeter chamber 18 for improved expansion of the gases and thus, noise suppression. The amount and size of the flow holes 15 in the first baffle 14 is optimized such, that simultaneously required load resistance and maximized flow capacity is provided. Advantageously, the open area is at least 50 %, more advantageously 80 % of the circumferential surface area of the first baffle. The first baffle 14 is joined to the support frame 12 by a joint 22 i.e. a rear end joint 22 for the first baffle 14. Joints 23 attach the center baffle/-s 16 to the adjacent baffles, in the example of the figure the center baffle is attached to the first baffle 14 and to the end baffle 17. The end baffle 17 is attached to the suppressor housing 13 by a joint 24, a front-end joint 24 for the end baffle 17. Between the outer circumference of the baffles 14, 16, 17 and the inner circumference of the suppressor housing a perimeter chamber 18 is formed.

The suppressor 10 according to the example of figures 1-2 comprises for expansion and burning the propellant gases the baffle chambers 34, 36, 37 inside the baffles 14, 16, 17, and the perimeter chamber 18 around the baffle chambers 34, 36, 37 and the baffles 14, 16, 17 inside the suppressor housing 13, and the rear chamber 19. The baffles 14, 16, 17 are preferably U- or M-shaped forming correspondingly shaped baffle chambers 34, 36, 37. The arms of the U- or M-shape extend backwards in the suppressor 10.

The joints 21, 22, 23 attaching the inner parts to the next part are located at respective ends of respective parts: the rear end cap 11, the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17, and are reopenable joints, preferably form-fitting joints with dimensions and shapes depending on requirement of the joint. For example fitting joints and/or shoulder-groove joints providing for easy and simple mounting of the inner parts to each other can be used. Also, the joint 24 between the end baffle 17 and the suppressor housing 13 is a reopenable joint, preferably a form-fitting joint with dimensions and shape depending on the requirements of the joint.

For example, a fitting joint and/or a shoulder-groove joint providing for easy and simple mounting of these parts to each other can be used. This also provides the modularity as these parts can easily be changed to required caliber and to adjust the sizes of the perimeter chamber 18 and the sizes and/or the number of the baffle chambers 34, 36, 37 inside the suppressor housing 13. Especially advantageous are also tapered joints and wedge-shaped joints, by which controlling of loads effecting the joint 22, 23, 24 is improved. In case of the tapered or wedge-shaped joints the inclined surfaces form a self-retaining surface towards the outer circumference of the suppressor (fig. 5).

The assembly of the suppressor 10 is performed in the assembly direction S i.e. from the back part of the suppressor. First by the reopenable joints 22, 23 the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17 are joined to one unity, which is attached by the joint 24 and the reopenable attachment 27 to the suppressor housing 13. The rear end cap 11 secures that the support frame 12 stays at its location. The support frame 12 is attached to the suppressor housing by the reopenable attachment 17 and the rear end cap 11 is attached by the reopenable attachment 28. Thus, between the support frame 12 and the rear end cap 11 an interface with contact between the support frame 12 and the rear end cap 11 is formed.

In figures 3-4 is schematically shown another example of the suppressor 10 comprising a suppressor housing 13 defining the outer surface of the suppressor 10. The suppressor housing 13 is formed of one substantially U-shaped uniform part, which has an opening at closed end of the U-shape and open end of the U-shape has an inner reopenable attachment 28 for attachment of a rear end cap 11 with the barrel opening 30. The travel direction of a projectile in the suppressor 10 is along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from left to right in the figure 3 and from right to left in the figure 4. Inside the suppressor 10 and the suppressor housing 13 is arranged a number of compartments configured to allow the gas to expand into and to burn out. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The suppressor housing 13 comprises reopenable attachments 27, 28 for a support frame 12 attached to the suppressor housing 13 by a reopenable support joint

27 (force-fit joint) and a rear end cap 11. At one end of the suppressor 10, at the back end of the suppressor 10, in the figure 3 at the left end and in the figure 4 at the right end, the suppressor 10 comprises a barrel opening 30 for a barrel of a firearm. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The suppressor 10 is attached to the front end of the barrel by a direct thread 26 for the barrel. Instead of the direct thread 26 also an interchangeable thread tubing/-s for different barrel thread sizes can be used. At another end of the suppressor 10, at the front end of the suppressor 10, in the figure 3 at the right end and in the figure 4 at the left end, the suppressor 10 comprises an outlet opening 20 for the projectile in an end baffle 17. A continuous channel for the projectile is formed along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from the barrel opening 30 to the outlet opening 20 for the projectile. Thus, the barrel opening 30 for the projectile to pass through the suppressor 10 extends through the suppressor 10 along the imaginary center axis of the suppressor 10.

The suppressor 10 comprises the rear end cap 11 at the back end of the suppressor 10 attached by the reopenable attachment 28 inside the suppressor housing 13. In this example the rear end cap 11 does not have an extension inside the suppressor housing 13 and no rear chamber is formed. The support frame 12, inside of which a front chamber 25 is arranged, is attached to the rear end cap 11 by a joint 21 between the rear end cap 11 and the support frame 12 and inside the suppressor housing 13 via the reopenable attachment 27 between the suppressor housing 13 and the support frame 12. The suppressor 10 also comprises seals (not shown) between the parts and elements for ensuring a tight and gas-sealed construction, where needed.

The support frame 12 has in this example a deflector surface 12B providing improved filling and improved expansion of the gases and thus, improved noise suppression. The barrel does not extend the full length of the barrel opening 30 as shown in the figure by line 30E indicating the end of the barrel in the barrel opening 30, but instead a clearance is provided between the end of the barrel 30E. This provides improved turning of the propellant gases. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces, for example by welding.

The support frame is made of material, which has required strength in view of the caliber, has as low as possible density, endures the heat and chemical strain of the propellant gases. Thus, advantageous material choices are titanium and its compositions, stainless steel and its special alloy options, aluminum compositions, as well as plastic and composite materials. For example density of titanium is about 4430kg/m^3, density of aluminium compositions is in 6000/7000-serietypes 2680kg/m^3 - 2810kg/m^3 density of steels is generally 7750kg/m^3 – 8050kg/m^3 and density of plastic materials is 900kg/m^3- 1300kg/m^3. Especially in respect of the location of the support frame 12 in the suppressor 10 being most sensitive titanium may be considered very advantageous material choice.

The support frame 12 is attached by the reopenable attachment 27 extending to substantially whole length of the support frame 12 to the inner circumferential surface of the housing 13 in front of the perimeter chamber 18 in this example. Thus, improved balance of the suppressor is provided as the center of gravity is close to the attachment point and supporting the suppressor structure and dividing loads more equally within the suppressor. The support frame 12 is configured to receive and distribute the loads effecting in the suppressor 10 and provides a self-supporting suppressor 10, as well as provides protection against heat and chemical effects of the propellant gases. The support frame 12 always supports the structural integrity of the suppressor 10 by taking up heaviest pressures and temperatures The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces, for example by welding..

The suppressor 10 further comprises the first, center and end baffles 14, 16, 17 located between the support frame 12 and the front end of the suppressor 10. The first baffle 14 may also be located to a non-first position, and thus the locations of the first baffle 14 and the center baffle 16 may be different than the one presented in the figure. Next to the support frame 12 is located a first baffle 14 comprising flow holes 15 around its perimeter and thereafter at least one center baffle 16 and an end baffle 17 are located. The example of the figure comprises one center baffle 16. The end baffle 17 is located inside the front end of the suppressor housing 13 and the suppressor 10 comprises an outlet opening 20 for the projectile in the end baffle 17.. Through the flow holes

15 the propellant gases are guided effectively to the perimeter chamber 18 for improved expansion of the gases and thus, noise suppression. The amount and size of the flow holes 15 in the first baffle 14 is optimized such, that simultaneously required load resistance and maximized flow capacity is provided. Advantageously, the open area is at least 50 %, more advantageously 80 % of the circumferential surface area of the first baffle. The first baffle 14 is joined to the support frame 12 by a joint 22 i.e. a rear end joint 22 for the first baffle 14. Joints 23 attach the center baffle/-s 16 to the adjacent baffles, in the example of the figure the center baffle 16 is attached to the first baffle 14 and to the end baffle 17. The end baffle 17 is attached to the suppressor housing 13 by a joint 24, a front-end joint 24 for the end baffle 17. Between the outer circumference of the baffles 14, 16, 17 and the inner circumference of the suppressor housing a perimeter chamber 18 is formed.

The suppressor 10 according to the example of figures 3-4 comprises for expansion and burning the propellant gases the baffle chambers 34, 36, 37 inside the baffles 14, 16, 17, and the perimeter chamber 18 around the baffle chambers 34, 36, 37 and the baffles 14, 16, 16 inside the suppressor housing 13. The baffles 14, 16, 17 are preferably U- or M-shaped forming correspondingly shaped baffle chambers 34, 36, 37. The arms of the U- or M-shape extend backwards in the suppressor 10.

The joints 21, 22, 23 attaching the inner parts to the next part are located at respective ends of respective parts: the rear end cap 11, the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17, and are reopenable joints, preferably form-fitting joints with dimensions and shape depending on the requirements of the joint. For example fitting joints and/or shoulder-groove joints providing for easy and simple mounting of the inner parts to each other can be used. Also, the joint 24 between the end baffle 17 and the suppressor housing 24 is a reopenable joint, preferably a form-fitting joint with dimensions and shape depending on the requirements of the joint. For example, a fitting and/or a shoulder-groove joint providing for easy and simple mounting of these parts to each other can be used. This also provides the modularity as these parts can easily be changed to required caliber and thus adjust sizes of the perimeter chamber 18 and the sizes and/or the number of the baffle chambers 34, 36, 37 inside the suppressor housing 13. Especially advantageous are also tapered joints and wedge-shaped joints, by which

controlling of loads effecting the joint 22, 23, 24 is improved. In case of the tapered or wedge-shaped joints the inclined surfaces form a self-retaining surface towards the outer circumference of the suppressor (fig. 5).

The assembly of the suppressor 10 is performed in the assembly direction S i.e. from the back part of the suppressor 10. First by the reopenable joints 22, 23 the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17 are joined to one unity, which is attached by the joint 24 and the reopenable attachment 27 to the suppressor housing 13. The rear end cap 11 secures that the support frame 12 stays at its location. The support frame 12 is attached to the suppressor housing by the reopenable attachment 17 and the rear end cap 11 is attached by the reopenable attachment 28. Thus, between the support frame 12 and the rear end cap 11 an interface with contact between the support frame 12 and the rear end cap 11 is formed. .

In figures 5-6 is schematically shown yet another example of the suppressor 10 comprising a suppressor housing 13 defining the outer surface of the suppressor 10. The suppressor housing 13 is formed of one substantially U-shaped uniform part, which has an opening at closed end of the U-shape and open end of the U-shape has an inner reopenable attachment 28 for attachment of a rear end cap 11 with the barrel opening 30. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The travel direction of a projectile in the suppressor 10 is along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from left to right in the figure 5 and from right to left in the figure 6. Inside the suppressor 10 and the suppressor housing 13 is arranged a number of compartments configured to allow the gas to expand into and to burn out. The suppressor housing 13 comprises reopenable attachments 27, 28 for a support frame 12 attached to the suppressor housing 13 by a reopenable support joint 27 (force-fit joint) and the rear end cap 11. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. At one end of the suppressor 10, at the back end of the suppressor 10, in the figure 5 at the left end and in the figure 6 at the right end, the suppressor 10 comprises the barrel opening 30 for a barrel of a firearm. The suppressor 10 is attached to the front end of the barrel by a direct thread 26 for the barrel. Instead of the direct thread

26 also an interchangeable thread tubing/-s for different barrel thread sizes can be used. At another end of the suppressor 10, at the front end of the suppressor 10, in the figure 5 at the right end and in the figure 6 at the left end, the suppressor 10 comprises an outlet opening 20 for the projectile in an end baffle 17. A continuous channel for the projectile is formed along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from the barrel opening 30 to the outlet opening 20 for the projectile. Thus, the barrel opening 30 for the projectile to pass through the suppressor 10 extends through the suppressor 10 along the imaginary center axis of the suppressor 10.

The suppressor 10 comprises the rear end cap 11 at the back end of the suppressor 10 attached by the reopenable attachment 28 inside the suppressor housing 13. In this example the rear end cap 11 extends as an extended part 11A a distance inside the suppressor housing 13 and a space 19, a rear chamber 19 is formed between the outer circumference of the end cap 11 and the inner circumference of the suppressor housing 13. The support frame 12 is attached to the rear end cap 11 by a joint 21 between the rear end cap 11 and the support frame 12 located at the front end of the extended part 11A of the rear end cap and inside the suppressor housing 13 via the reopenable attachment 27 between the suppressor housing 13 and the support frame 12. The rear end cap 11 extends partially inside the support frame 12. The suppressor 10 also comprises seals (not shown) between the parts and elements for ensuring a tight and gas-sealed construction, where needed.

The support frame 12 has in this example a deflector surface 12B providing improved filling and improved expansion of the gases and thus, improved noise suppression. The barrel does not extend the full length of the barrel opening 30 as shown in the figure by line 30E indicating the end of the barrel in the barrel opening 30, but instead a clearance is provided between the end of the barrel 30E. This provides improved turning of the propellant gases.

The support frame 12 is attached by the reopenable attachment 27 extending to substantially whole length of the support frame 12 to the inner circumferential surface of the suppressor housing 13 between the rear chamber 19 and the perimeter chamber 18 in this example. Thus, improved

balance of the suppressor is provided as the center of gravity is close to the attachment point and supporting the suppressor structure and dividing loads more equally within the suppressor. The support frame 12 is configured to receive and distribute the loads effecting in the suppressor 10 and provides a self-supporting suppressor 10, as well as provides protection against heat and chemical effects of the propellant gases. The support frame 12 always supports the structural integrity of the suppressor 10 by taking up heaviest pressures and temperatures. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces, for example by welding.

The support frame is made of material, which has required strength in view of the caliber, has as low as possible density, endures the heat and chemical strain of the propellant gases. Thus, advantageous material choices are titanium and its compositions, stainless steel and its special alloy options, aluminum compositions, as well as plastic and composite materials. For example density of titanium is about 4430kg/m^3, density of aluminium compositions is in 6000/7000-serietypes 2680kg/m^3 – 2810kg/m^3 density of steels is generally 7750kg/m^3 – 8050kg/m^3 and density of plastic materials is 900kg/m^3- 1300kg/m^3. . Especially in respect of the location of the support frame 12 in the suppressor 10 being most sensitive titanium may be considered very advantageous material choice.

The suppressor 10 further comprises the first, center and end baffles 14, 16, 17 located between the support frame 12 and the front end of the suppressor 10. The first baffle 14 may also be located to a non-first position, and thus the locations of the first baffle 14 and the center baffle 16 may be different than the one presented in the figure. Next to the support frame 12 is located a first baffle 14 comprising flow holes 15 around its perimeter and thereafter at least one center baffle 16 and an end baffle 17 are located. In the example of the figure there is one center baffle 16. The end baffle 17 is located inside the front end of the suppressor housing 13 and the suppressor 10 comprises an outlet opening 20 for the projectile in the end baffle 17.. Through the flow holes 15 the propellant gases are guided effectively to the perimeter chamber 18 for improved expansion of the gases and thus, noise suppression. The amount and size of the flow holes 15 in the first baffle 14is optimized such, that simultaneously required load resistance and maximized flow capacity is

provided. Advantageously, the open area is at least 50 %, more advantageously at least 80 % of the circumferential surface area of the first baffle. The first baffle 14 is joined to the support frame 12 by a joint 22 i.e. a rear end joint 22 for the first baffle 14. Joints 23 attach the center baffle 16 to the adjacent baffles, int the example of the figure to the first baffle 14 and to the end baffle 17. The end baffle 17 is attached to the suppressor housing 13 by a joint 24, a front-end joint 24 for the end baffle 17. Between the outer circumference of the baffles 14, 16, 17 and the inner circumference of the suppressor housing a perimeter chamber 18 is formed.

The suppressor 10 according to the example of figures 5-6 comprises for expansion and burning the propellant gases the baffle chambers 34, 36, 37 inside the baffles 14, 16, 17, and the perimeter chamber 18 around the baffle chambers 34, 36, 37 and the baffles 14, 16, 17 inside the suppressor housing 13, and the rear chamber 19. The baffles 14, 16, 17 are preferably U- or M-shaped forming correspondingly shaped baffle chambers 34, 36, 37. The arms of the U- or M-shape extend backwards in the suppressor 10.

The joints 21, 22, 23 attaching the inner parts to the next part are located at respective ends of respective parts: the rear end cap 11, the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17, and are reopenable joints, preferably form-fitting joints with dimensions and shapes depending on the requirement of the joints. For example fitting and/or shoulder-groove joints providing for easy and simple mounting of the inner parts to each other can be used. Also, the joint 24 between the end baffle 17 and the suppressor housing 13 is a reopenable joint, preferably a form-fitting joint with dimensions and shape depending on the requirement of the joint. For example, a fitting and/or a shoulder-groove joint providing for easy and simple mounting of these parts to each other can be used. This also provides the modularity as these parts can easily be changed to required caliber and to adjust the sizes of the perimeter chamber 18 and the sizes and/or the number of the baffle chambers 34, 36, 37 inside the suppressor housing 13. Especially advantageous are also tapered joints and wedge-shaped joints as shown in this example of figures 5-6, by which controlling of loads effecting the joint is improved. In case of the tapered or wedge-shaped joints the inclined surfaces form a self-retaining surface towards the outer circumference of the suppressor (fig. 5).

The assembly of the suppressor 10 is performed in the assembly direction S i.e. from the back part of the suppressor 10. First by the reopenable joints 22, 23 the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17 are joined to one unity, which is attached by the joint 24 and the reopenable attachment 27 to the suppressor housing 13. The rear end cap 11 secures that the support frame 12 stays at its location. The support frame 12 is attached to the suppressor housing by the reopenable attachment 17 and the rear end cap 11 is attached by the reopenable attachment 28. Thus, between the support frame 12 and the rear end cap 11 an interface with contact between the support frame 12 and the rear end cap 11 is formed.

In figures 7-8 is schematically shown an example of the suppressor 10 suitable for versions attached directly to the barrel around it. The suppressor comprises a suppressor housing 13 defining the outer surface of the suppressor 10. The suppressor housing 13 is formed of one substantially U-shaped uniform part, which has an opening at closed end of the U-shape and open end of the U-shape has an inner reopenable attachment 28 for attachment of a rear end cap 11 with the barrel opening 30. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The travel direction of a projectile in the suppressor 10 is along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from left to right in the figure 7 and from right to left in the figure 8. Inside the suppressor 10 and the suppressor housing 13 is arranged a number of compartments configured to allow the gas to expand into and to burn out. The suppressor housing 13 comprises reopenable attachments 27, 28 for a support frame 12 attached to the suppressor housing 13 by a reopenable support joint (force-fit joint) 27 and the rear end cap 11. At one end of the suppressor 10, at the back end of the suppressor 10, in the figure 7 at the left end and in the figure 8 at the right end, the suppressor 10 comprises the barrel opening 30 for a barrel of a firearm. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. The suppressor 10 is attached to the front end of the barrel by a direct thread 26 for the barrel. Instead of the direct thread 26 also an interchangeable thread tubing/-s for different barrel thread sizes can be used. At another end of the suppressor 10, at the front end of the suppressor

10, in the figure 7 at the right end and in the figure 8 at the left end, the suppressor 10 comprises an outlet opening 20 for the projectile in an end baffle 17. A continuous channel for the projectile is formed along the imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor 10 from the barrel opening 30 to the outlet opening 20 for the projectile. Thus, the barrel opening 30 for the projectile to pass through the suppressor 10 extends through the suppressor 10 along the imaginary center axis of the suppressor 10.

The suppressor 10 comprises the rear end cap 11 at the back end of the suppressor 10 attached by the reopenable attachment 28 inside the suppressor housing 13. The reopenable attachment may be a thread attachment, a locking ring attachment, a pressed-on fitting attachment or another corresponding form-fitting attachment. In this example a rear chamber 19 is formed between the barrel located in the barrel opening 30 and the inner circumference of the suppressor housing 13. The suppressor 10 also comprises seals (not shown) between the parts and elements for ensuring a tight and gas-sealed construction, where needed.

The support frame 12 has in this example a deflector surface 12B providing improved filling and improved expansion of the gases and thus, improved noise suppression. The barrel does not extend the full length of the barrel opening 30 as shown in the figure by line 30E indicating the end of the barrel in the barrel opening 30, but instead a clearance is provided between the end of the barrel 30E. This provides improved turning of the propellant gases. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces for example by welding.

The support frame 12 is attached by the reopenable attachment 27 extending to substantially whole length of the support frame 12 to the inner circumferential surface of the suppressor housing 13 between the rear chamber 19 and the perimeter chamber 18 in this example. Thus, improved balance of the suppressor is provided as the center of gravity is close to the attachment point and supporting the suppressor structure and dividing loads more equally within the suppressor. The support frame 12 is configured to receive and distribute the loads effecting in the suppressor 10 and provides a self-supporting suppressor 10, as well as provides protection against heat and

chemical effects of the propellant gases. The support frame 12 always supports the structural integrity of the suppressor 10 by taking up heaviest pressures and temperatures. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces, for example by welding.

The support frame is made of material, which has required strength in view of the caliber, has as low as possible density, endures the heat and chemical strain of the propellant gases. Thus, advantageous material choices are titanium and its compositions, stainless steel and its special alloy options, aluminum compositions, as well as plastic and composite materials. For example density of titanium is about 4430kg/m^3, density of aluminium compositions is in 6000/7000-serietypes 2680kg/m^3 - 2810kg/m^3 density of steels is generally 7750kg/m^3 – 8050kg/m^3 and density of plastic materials is 900kg/m^3- 1300kg/m^3. . Especially in respect of the location of the support frame 12 in the suppressor 10 being most sensitive titanium may be considered very advantageous material choice.

The suppressor 10 further comprises the first, center and end baffles 14, 16, 17 located between the support frame 12 and the front end of the suppressor 10. The first baffle 14 may also be located to a non-first position, and thus the locations of the first baffle 14 and the center baffle 16 may be different than the one presented in the figure. The end baffle 17 is located inside the front end of the suppressor housing 13 and the suppressor 10 comprises an outlet opening 20 for the projectile in the end baffle 17. Next to the support frame 12 is located a first baffle 14 comprising flow holes 15 around its perimeter and thereafter at least one center baffle 16, the example of the figure comprises one center baffle 16 and an end baffle 17 are located. Through the flow holes 15 the propellant gases are guided effectively to the perimeter chamber 18 for improved expansion of the gases and thus, noise suppression. The amount and size of the flow holes 15 in the first baffle 14 is optimized such, that simultaneously required load resistance and maximized flow capacity is provided. Advantageously, the open area is at least 50 %, more advantageously 80 % of the circumferential surface area of the first baffle. The first baffle 14 is joined to the support frame 12 by a joint 22 i.e. a rear end joint 22 for the first baffle 14. Joints 23 attach the center baffle/-s 16 to the adjacent baffles, in the example of the figure the center baffle is attached to the first

baffle 14 and to the end baffle 17. The end baffle 17 is attached to the suppressor housing 13 by a joint 24, a front-end joint 24 for the end baffle 17. Between the outer circumference of the baffles 14, 16, 17 and the inner circumference of the suppressor housing a perimeter chamber 18 is formed.

The suppressor 10 according to the example of figures 7-8 comprises for expansion and burning the propellant gases the baffle chambers 34, 36, 37 inside the baffles 14, 16, 17, and the perimeter chamber 18 around the baffle chambers 34, 36, 37 and the baffles 14, 16, 17 inside the suppressor housing 13, and the rear chamber 19. The baffles 14, 16, 17 are preferably U- or M-shaped forming correspondingly shaped baffle chambers 34, 36, 37. The arms of the U- or M-shape extend backwards in the suppressor 10.

The joints 22, 23 attaching the inner parts to the next part are located at respective ends of respective parts: the rear end cap 11, the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17, and are reopenable joints, preferably form-fitting joints with dimensions and shapes depending on requirement of the joint. For example fitting joints and/or shoulder-groove joints providing for easy and simple mounting of the inner parts to each other can be used. Also, the joint 24 between the end baffle 17 and the suppressor housing 13 is a reopenable joint, preferably a form-fitting joint with dimensions and shape depending on the requirements of the joint. For example, a fitting joint and/or a shoulder-groove joint providing for easy and simple mounting of these parts to each other can be used. This also provides the modularity as these parts can easily be changed to required caliber and to adjust the sizes of the perimeter chamber 18 and the sizes and/or the number of the baffle chambers 34, 36, 37 inside the suppressor housing 13. Especially advantageous are also tapered joints and wedge-shaped joints, by which controlling of loads effecting the joint 22, 23, 24 is improved. In case of the tapered or wedge-shaped joints the inclined surfaces form a self-retaining surface towards the outer circumference of the suppressor (fig. 5).

The assembly of the suppressor 10 is performed in the assembly direction S i.e. from the back part of the suppressor. First by the reopenable joints 22, 23 the support frame 12, the first baffle 14, the center baffle/-s 16 and the end baffle 17 are joined to one unity, which is attached by the joint 24 and the

reopenable attachment 27 to the suppressor housing 13. The support frame 12 is attached to the suppressor housing by the reopenable attachment 17 and the rear end cap 11 is attached by the reopenable attachment 28.

In figures 9A-9B is schematically shown an example of a support element 12 of a suppressor of a firearm. The support frame 12 forms a deflector surface 12B providing improved filling and improved expansion of the gases and thus, improved noise suppression. The deflector surface 12B is provided with a flow opening 12D. The support frame 12 comprises at least one support element 12C between its outer and inner structure to provide for an optimize volumetric flow rate through the flow opening12D for the propellant gases.

The support frame 12 has on its outer surface the reopenable attachment 27 extending to substantially whole length of the support frame 12 for attachment to the inner circumferential surface of the suppressor housing. Thus, improved balance of the suppressor is provided as the center of gravity is close to the attachment point and supporting the suppressor structure and dividing loads more equally within the suppressor. The support frame 12 is configured to receive and distribute the loads effecting in the suppressor 10 and provides a self-supporting suppressor 10, as well as provides protection against heat and chemical effects of the propellant gases. The support frame 12 always supports the structural integrity of the suppressor 10 by taking up heaviest pressures and temperatures. The support frame 12 is a uniform structure made of one piece or of two or more permanently attached pieces, for example by welding.

The support frame 12 is made of material, which has required strength in view of the caliber, has as low as possible density, endures the heat and chemical strain of the propellant gases. Thus, advantageous material choices are titanium and its compositions, stainless steel and its special alloy options, aluminum compositions, as well as plastic and composite materials. For example density of titanium is about 4430kg/m^3, density of aluminium compositions is in 6000/7000-serietypes 2680kg/m^3 - 2810kg/m^3 density of steels is generally 7750kg/m^3 – 8050kg/m^3 and density of plastic materials is 900kg/m^3- 1300kg/m^3. Especially in respect of the location of the support frame 12 in the suppressor 10 being most sensitive titanium may be considered very advantageous material choice.

In the description in the foregoing, although some functions and elements have been described with reference to certain features and examples, those functions and elements may be performable by other features and examples whether described or not. Although features have been described with reference to certain embodiments or examples, those features may also be present in other embodiments or examples whether described or not.

Above only some advantageous examples of the inventions have been described to which examples the invention is not to be narrowly limited and many modifications and alterations are possible within the invention.

Reference signs used in the figures:

10 suppressor
11 rear end cap
12 support frame
12B deflector surface
12C support element
12D flow opening
13 suppressor housing
14 first baffle
15 holes
16 center baffle
17 end baffle
18 perimeter chamber
19 rear chamber
20 outlet opening for the projectile
21 joint between the rear end cap and the support frame
22 rear end joint for the first baffle
23 joint for the center baffle
24 front end joint for the end baffle
25 front chamber
26 direct thread for the barrel
27 reopenable attachment between the suppressor housing and the support frame
28 reopenable attachment between the suppressor housing and the rear end cap
30 barrel opening
30E end of the barrel
34 first baffle chamber
36 center baffle chamber
37 end baffle chamber
S assembly direction

Claims

1. Firearm suppressor, which suppressor (10) has a substantially rotationally symmetrical cylindrical form and comprises a suppressor housing (13), a rear end cap (11), a plurality of chambers (18, 19, 25, 34, 36, 37) for expansion and burning of propellant gases and arranged inside the suppressor housing (13), a barrel opening (30), an outlet opening (20) for a projectile and a continuous channel along an imaginary center axis of the rotationally symmetrical cylindrical form of the suppressor (10) from the barrel opening (30) to the outlet opening (20) for the projectile configured to be fired by the firearm, **characterized in that** the suppressor (10) comprises a support frame (12) attached to the suppressor housing (13) by a reopenable support joint (27), that the suppressor (10) further comprises the baffles (14, 16, 17) located between the support frame (12) and the front end of the suppressor (10) and that the suppressor further comprises form-fitting, reopenable joints (23) to attach the baffles (14, 16, 17) to adjacent baffle/-s thereof.

2. Firearm suppressor according to claim 1, **characterized** in that the baffles comprise a first baffle (14), at least one center baffle (16) and an end baffle (17) and that the first baffle (14) is joined to the support frame (12) by a form-fitting, reopenable joint (22), that the form-fitting, reopenable joints (23) attach the center baffle (16) to the adjacent baffles (14, 17) and that the end baffle (17) is attached to the suppressor housing (13) by a form-fitting reopenable joint (24).

3. Firearm suppressor according to claim 1 or 2, **characterized in that** the form-fitting, reopenable joints (21, 22, 23, 24) are shoulder-groove joints and/or tapered joints and/or wedge-shaped joints.

4. Firearm suppressor according to claim 3, **characterized in that** the tapered or wedge-shaped joints comprise inclined surfaces configured to form a self-retaining surface towards outer circumference of the suppressor (10).

5. Firearm suppressor according to any of previous claims, **characterized in that** the first baffle (14) comprises flow holes (15) around its perimeter.

6. Firearm suppressor according to any of previous claims, **characterized in that** between the outer circumference of the baffles (14, 16, 17) and the inner circumference of the suppressor housing (13) a perimeter chamber (18) is formed.

7. Firearm suppressor according to any of previous claims, **characterized in that** the propellant gases are configured to be guided through the flow holes (15) to the perimeter chamber (18).

8. Firearm suppressor according to any of previous claims, **characterized in that** the suppressor housing (13) is formed of one substantially U-shaped uniform part.

9. Firearm suppressor according to claim 8, **characterized in that** the suppressor housing (13) has an opening at closed end of the U-shape and that open end of the U-shape has an inner reopenable attachment (28) for attachment of the rear end cap (11) with the barrel opening (30).

10. Firearm suppressor according to any of previous claims, **characterized in that** the rear end cap (11) is located at the back end of the suppressor (10) and attached inside the suppressor housing (13) by a reopenable attachment (28) between the suppressor housing (13) and the rear end cap (11), that the support frame (12) is attached to the rear end cap (11) by a reopenable joint (21) between the rear end cap (11) and the support frame (12) and that the support frame (12) is attached inside the suppressor housing (13) by a reopenable attachment (27) between the suppressor housing (13) and the support frame (12).

11. Firearm suppressor according to any of previous claims, **characterized** in that the suppressor (10) comprises a rear chamber (19) formed between the outer circumference of the end cap (11) and the inner circumference of the suppressor housing (13).

12. Firearm suppressor according to any of previous claims, **characterized in that** the suppressor (10) comprises a front chamber (25) formed inside the support frame (12).

13. Firearm suppressor according to any of previous claims, **characterized in that** the suppressor (10) has a modular structure.

14. A firearm comprising a suppressor (10) according to any of the claims 1-13.

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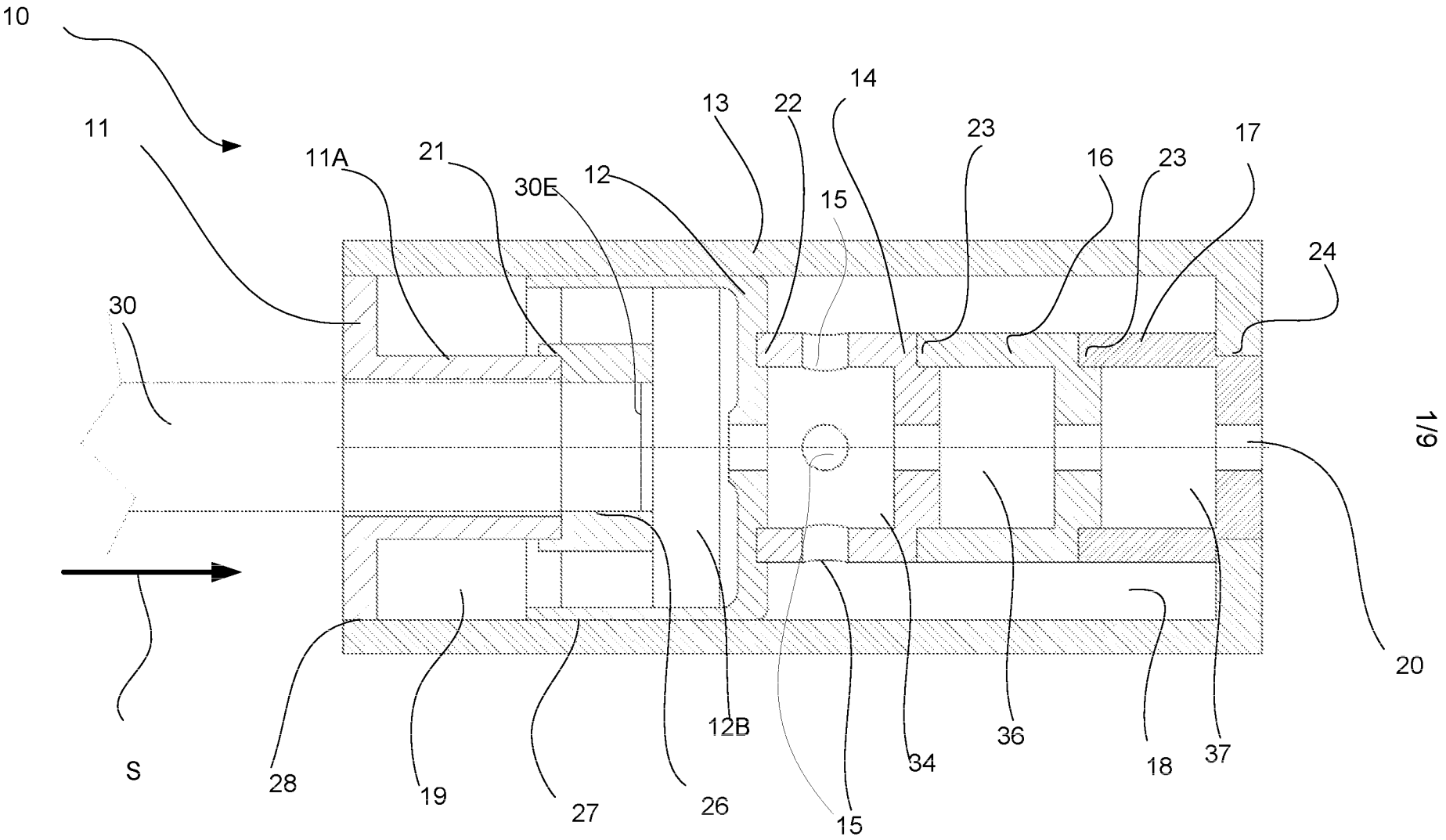

Fig. 1

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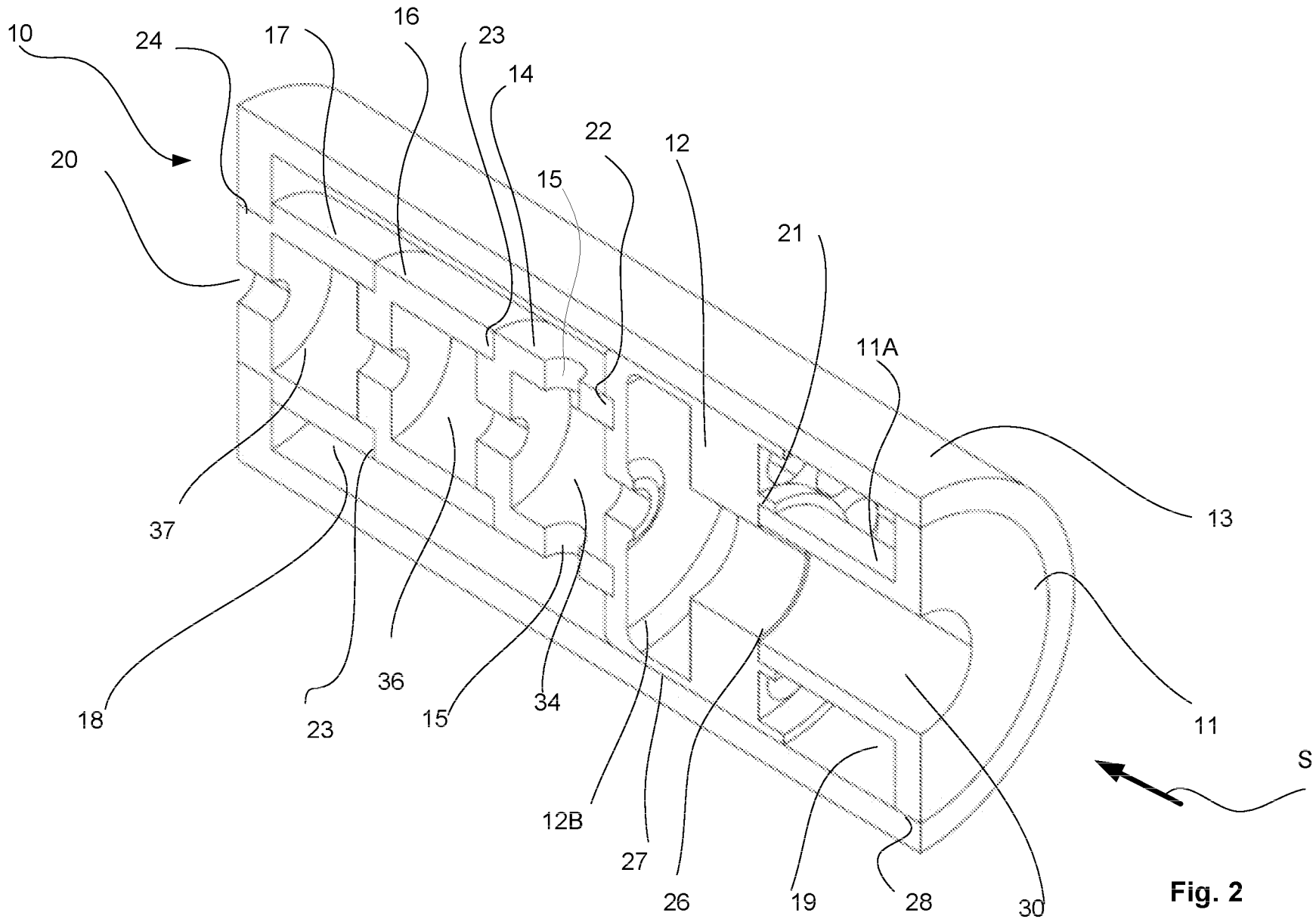

Fig. 2

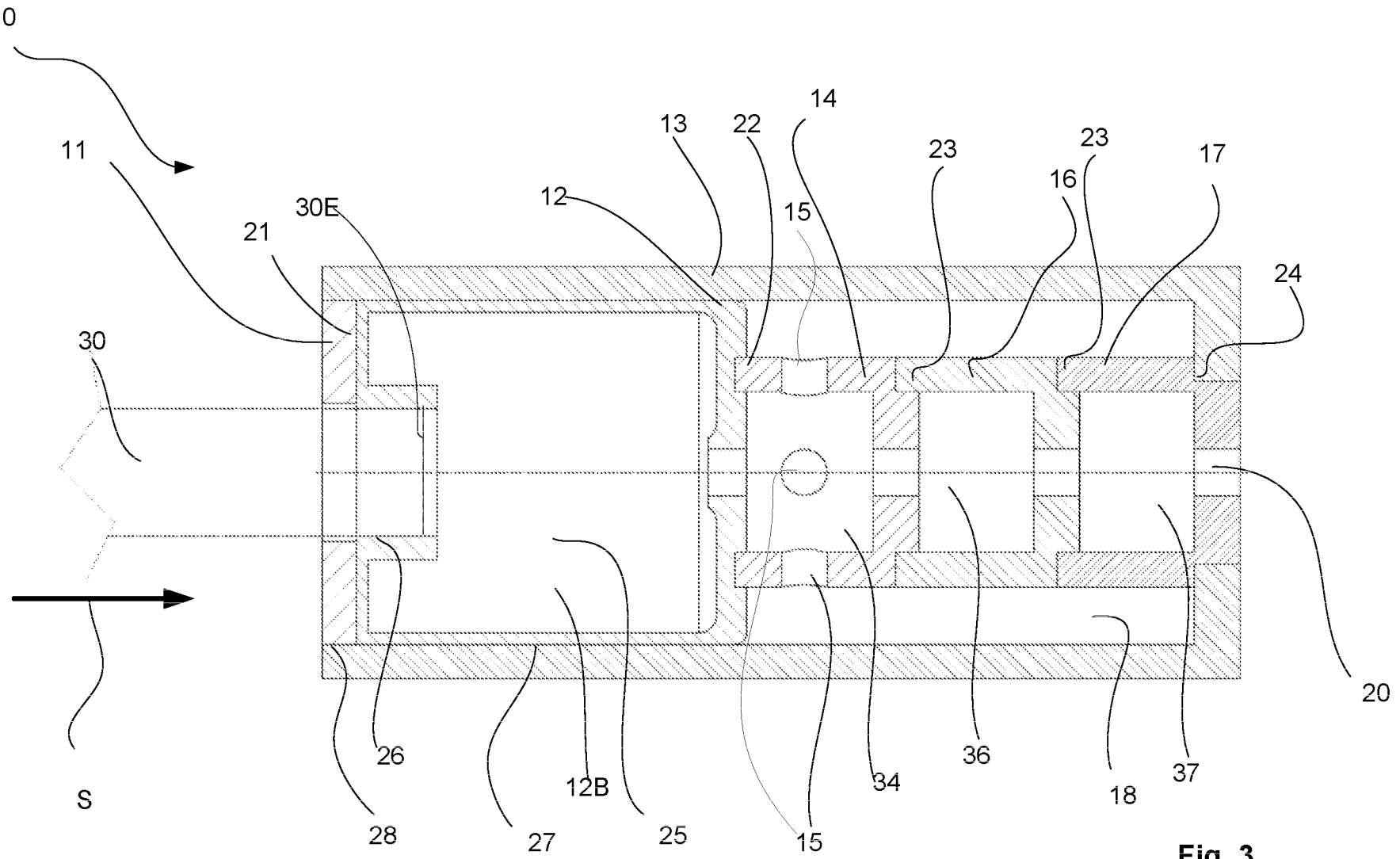

Fig. 3

20235280 PRH 10 -03- 2023

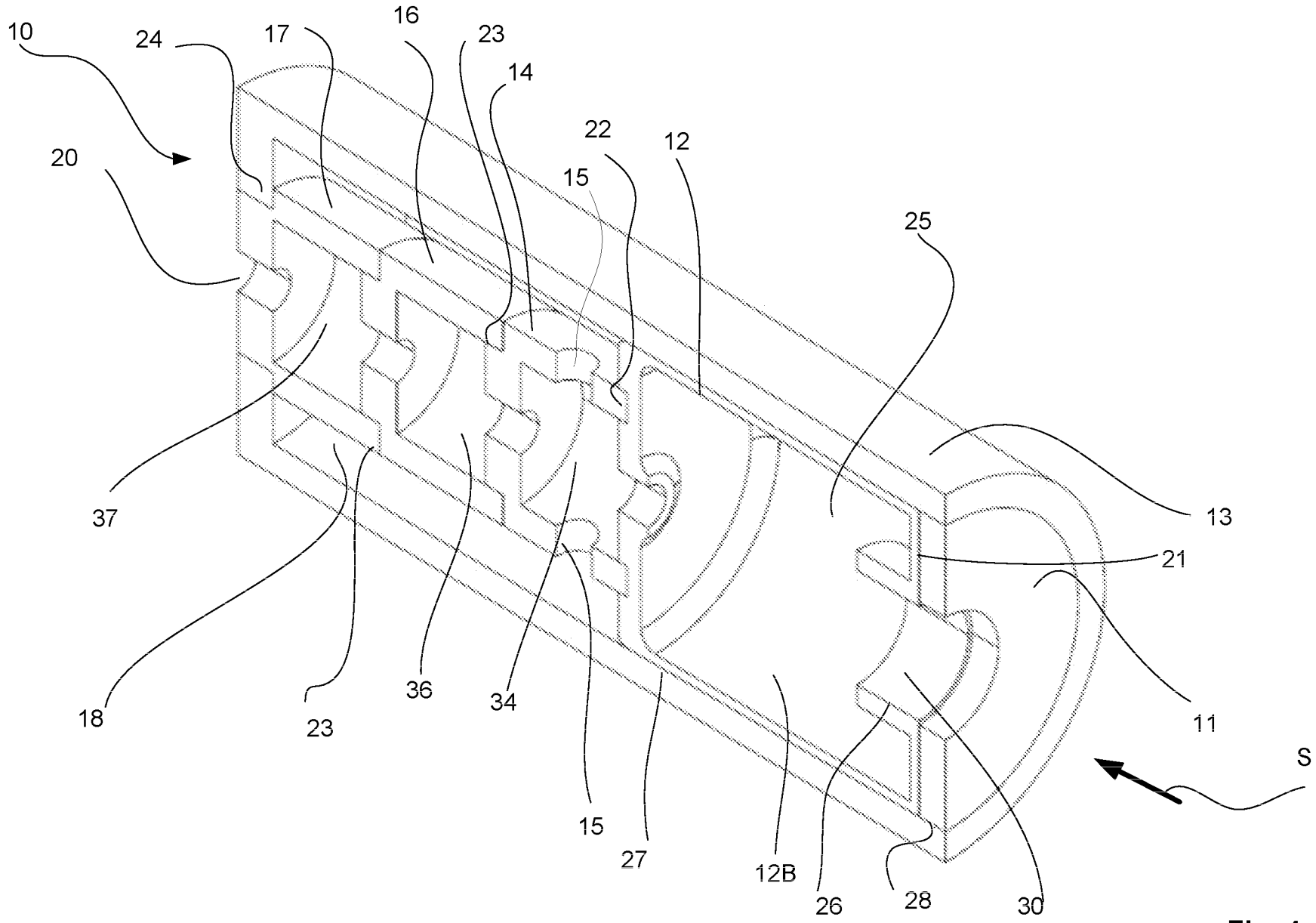

Fig. 4

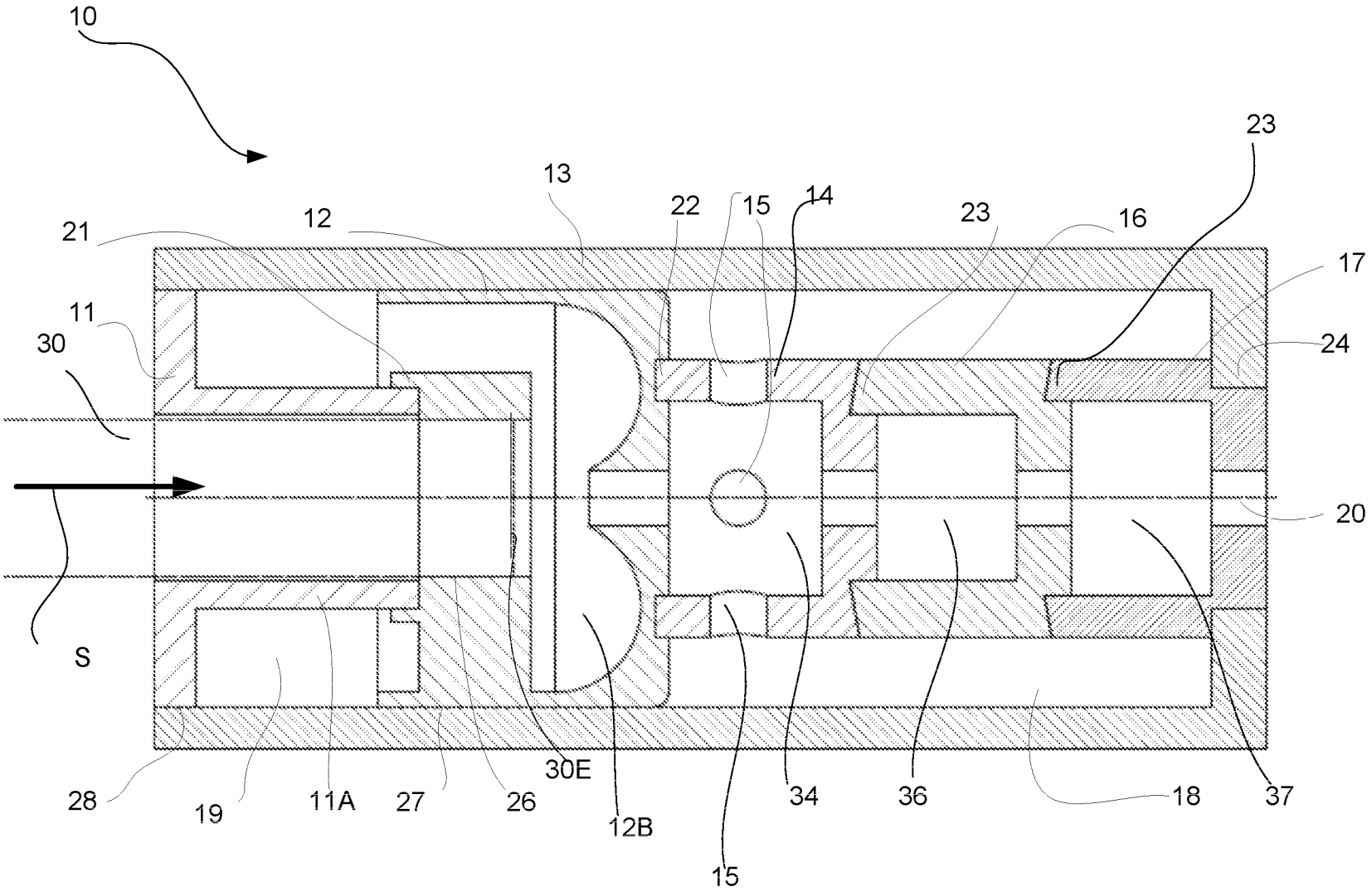

Fig. 5

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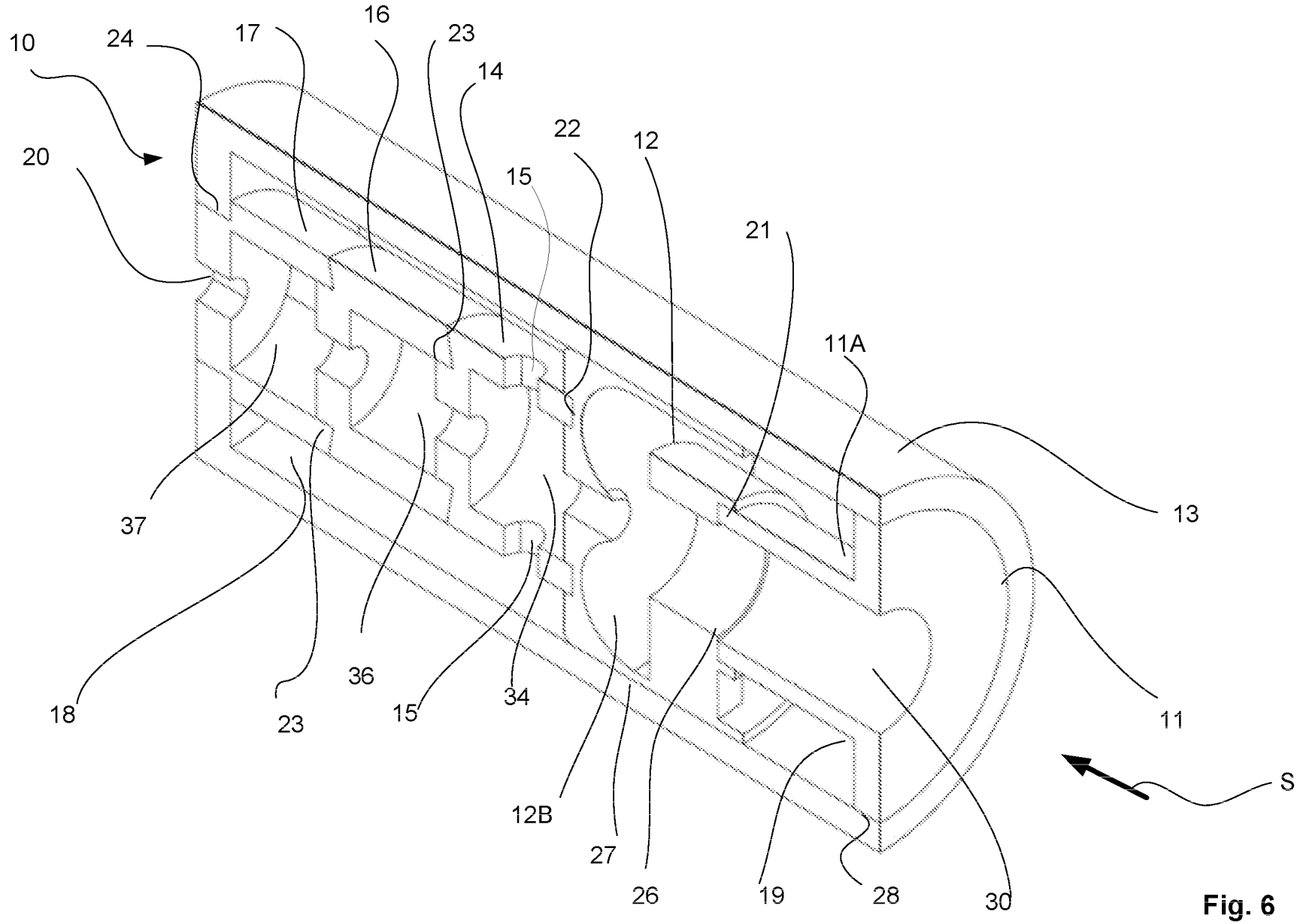

Fig. 6

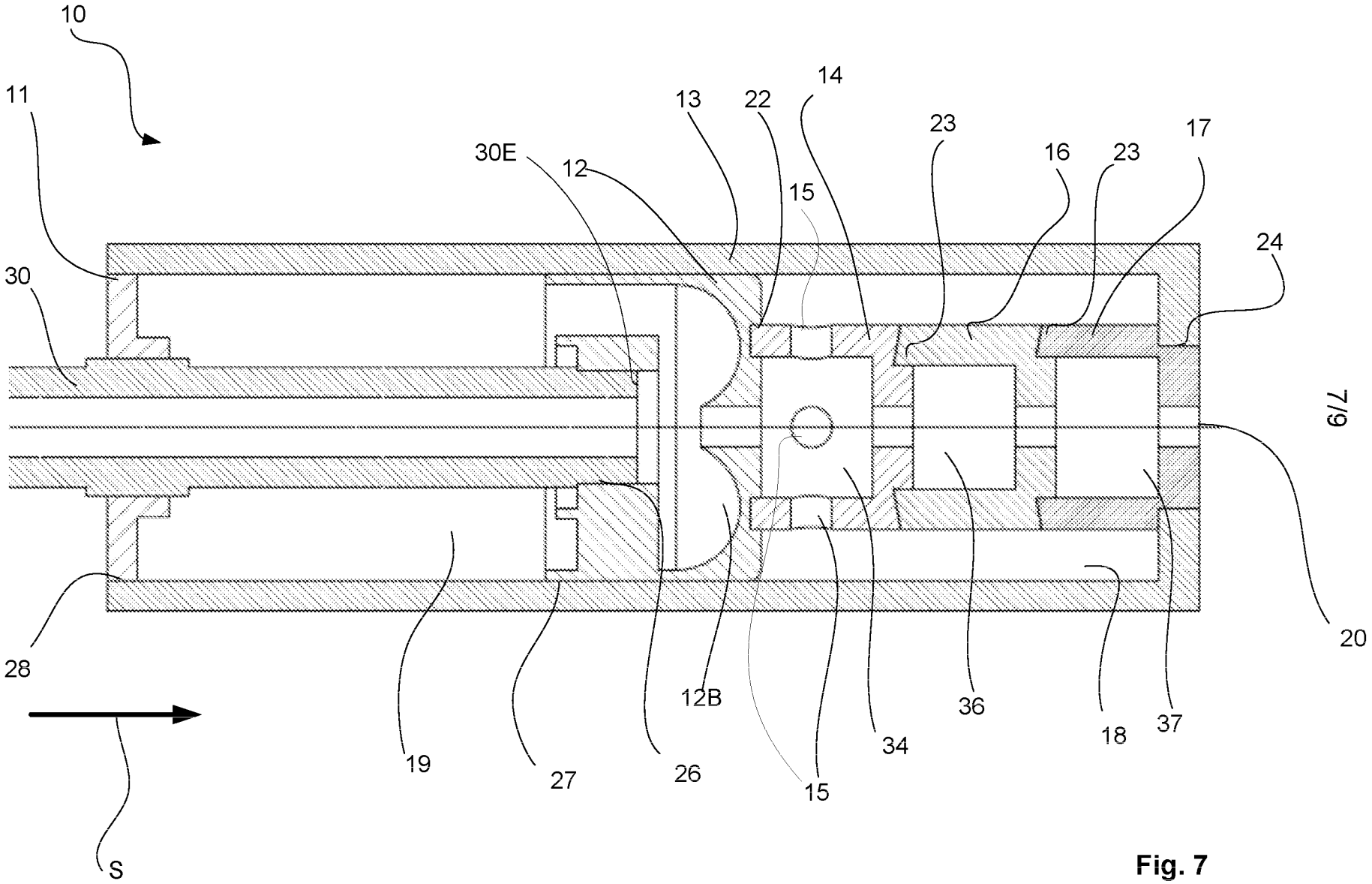

Fig. 7

20235280 PRH 10 -03- 2023

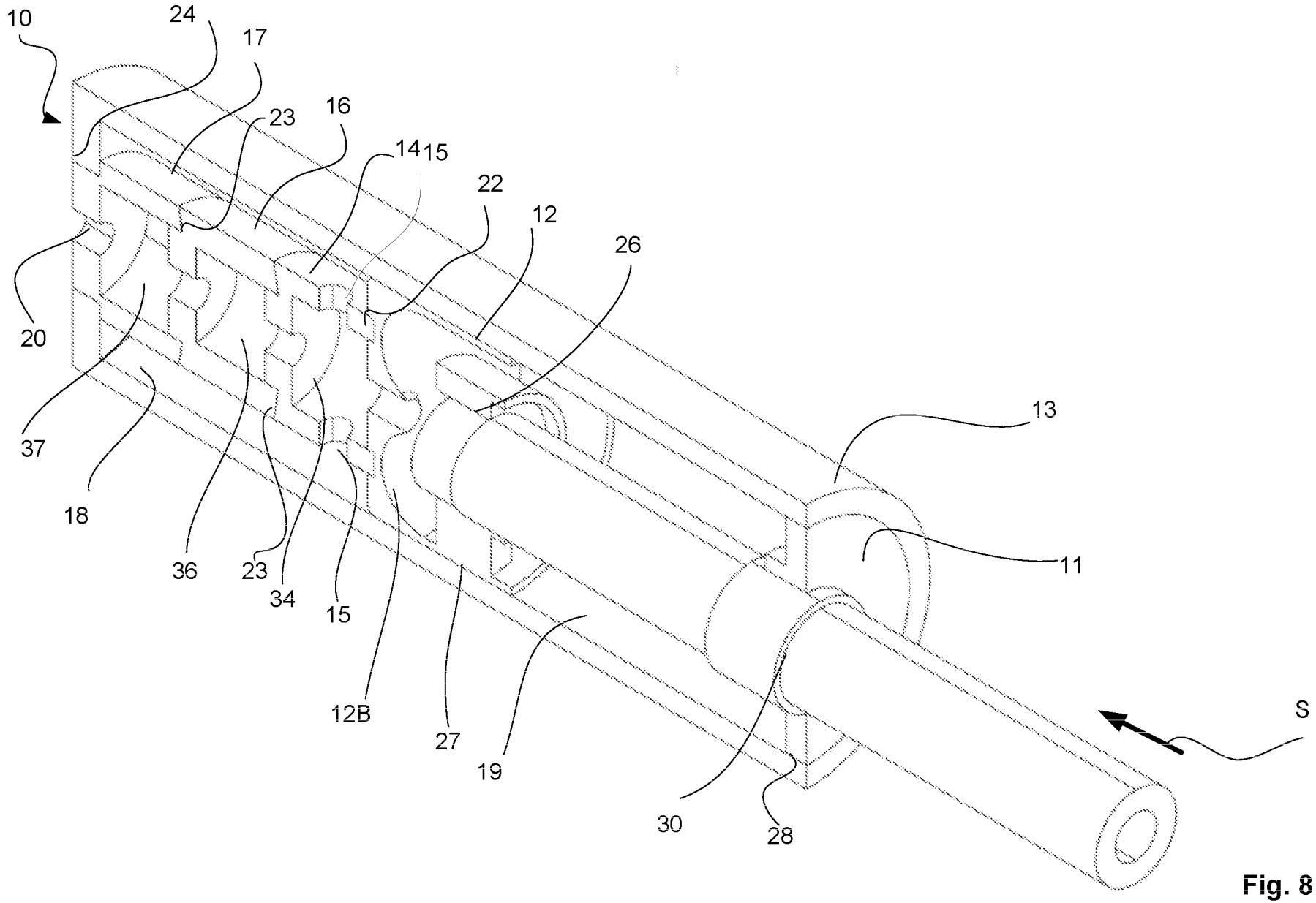

Fig. 8

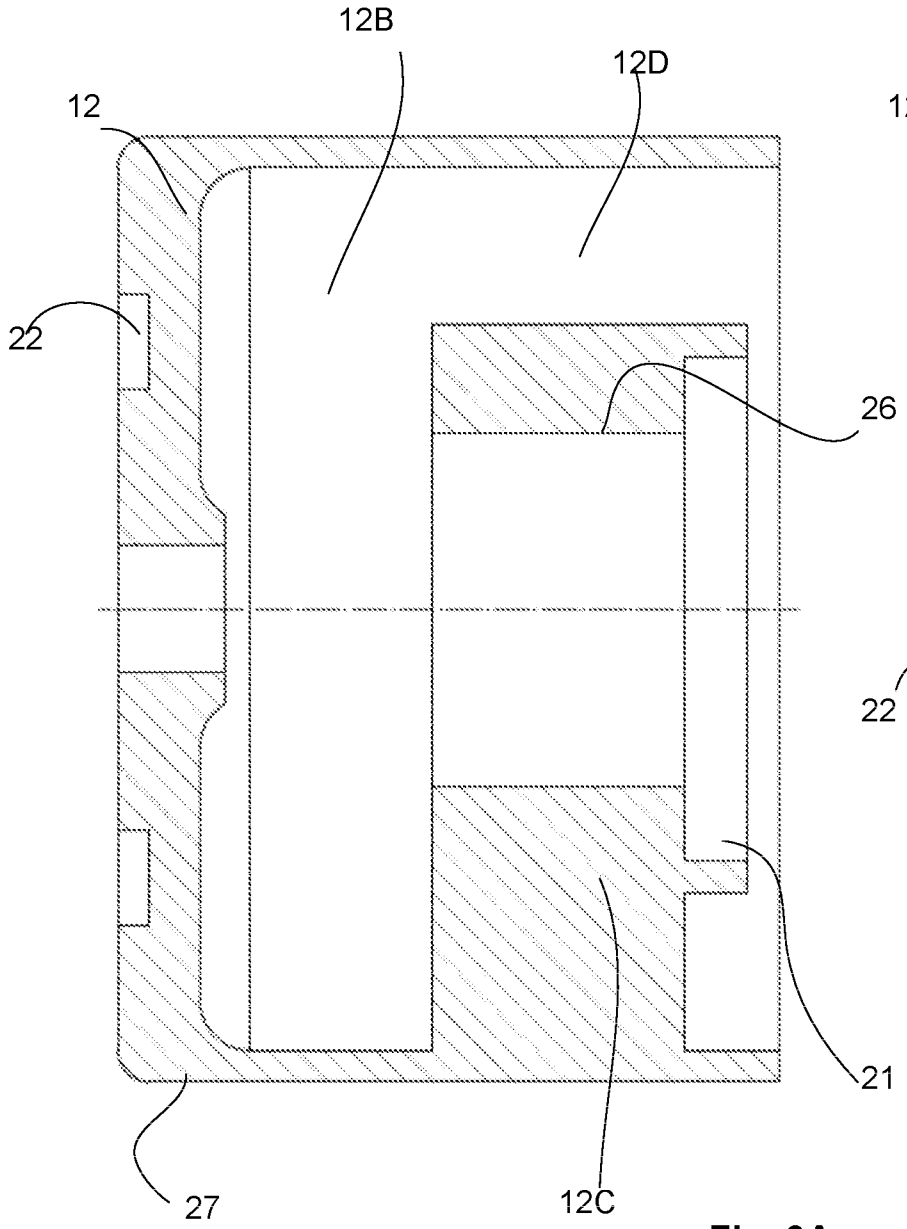

Fig. 9A

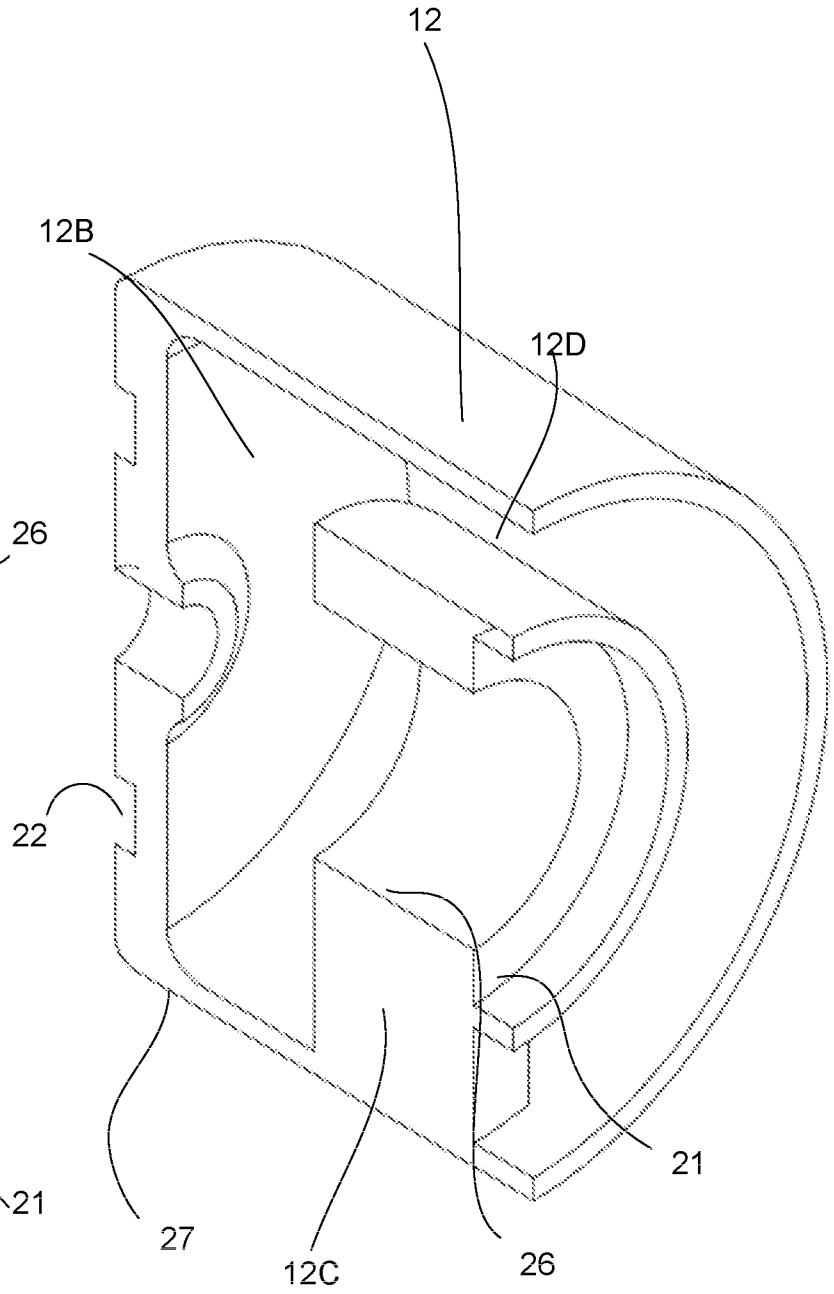

Fig. 9B

FINNISH PATENT AND REGISTRATION OFFICE **SEARCH REPORT**

Finnish Patent and Registration Office
FI-00091 PRH

PATENT APPLICATION No.	CLASSIFICATION	
20235280	IPC ***F41A 21/30*** (2006.01)	CPC **F41A 21/30**

PATENT CLASSES SEARCHED (classification systems and classes)
IPC: F41A

DATABASES CONSULTED DURING THE SEARCH
EPODOC, EPO-Internal full-text databases, Full-text translation databases from Asian languages, WPIAP, IPRally

DOCUMENTS CONSIDERED TO BE RELEVANT

Category*)	Bibliographic data on the document and relevant passages	Relevant to claims
X	US 2016018179 A1 (MORRIS SCOTT WAYNE [US] et al.) 21 January 2016 (21.01.2016) whole document, especially paragraphs [0002], [0003], [0029] – [0057]; figures 1A-11B	1, 3, 12-14
X	US 2017299313 A1 (ADAMSON JR DAVID K [US]) 19 October 2017 (19.10.2017) whole document, especially paragraphs [0001], [0009] – [0069]; figures 1-7	1, 6, 11-14

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*) X Document indicating that the invention is not novel or does not involve an inventive step with respect to the state of the art.
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This document has been electronically signed. **Further information given in the annex** ☐

Date	Senior Patent Examiner
09.10.2023	Lauri Louhiluoto
	Telephone +358 29 509 5000

FINNISH PATENT AND REGISTRATION OFFICE **SEARCH REPORT**
Finnish Patent and Registration Office
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DOCUMENTS CONSIDERED TO BE RELEVANT, CONTINUED

Category*)	Bibliographic data on the document and relevant passages	Relevant to claims
X	US 2014224574 A1 (LATKA GREGORY S [US]) 14 August 2014 (14.08.2014) whole document, especially paragraphs [0015] – [0032]; figures 1-3	1-7, 10-14
Y		8, 9
Y	WO 2017044586 A1 (SILENCERCO LLC [US]) 16 March 2017 (16.03.2017) whole document, especially page 13, line 11 – page 14, line 13; figures 10-13	8, 9
A	US 2022034619 A1 (TIZIANI MICHAEL ROBERT [US]) 03 February 2022 (03.02.2022) whole document, especially paragraphs [0002], [0019]-[0026]; figures 1-6	1-14
A	US 2017160034 A1 (PARKER JOSHUA J [US]) 08 June 2017 (08.06.2017) whole document, especially paragraphs [0034], [0041]; claim 1; figures 1-23	1-14