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(54) **PYROTECHNIC IGNITION DEVICE FOR PYROTECHNIC ARTICLES**

(57) The present invention relates to a pyrotechnic ignition device (7) for pyrotechnic articles (1), such as fireworks and flares. The ignition device comprises a fuse member (9) having an ignition portion (9a) and an ignition heat transmitting portion (9b), and an ignition heat receiving member (11, 13, 15) arranged to receive ignition heat from said ignition heat transmitting portion (9b) for ignition of the pyrotechnic article (1) when the ignition device (7) is situated in an ignition position.

A movable member (27) of the ignition device (7) is movable under the action of gravity from said ignition position to a non-ignition position in which said fuse member (9) is prevented from transmitting ignition heat to said ignition heat receiving member (11, 13, 15).

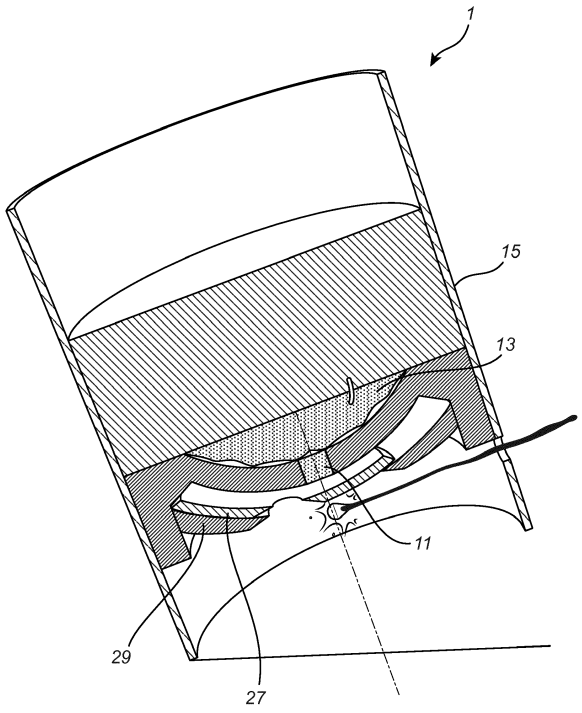

Fig. 1c

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Description

Technical Field of the Invention

[0001] The present invention relates to a pyrotechnic ignition device for pyrotechnic articles, such as fireworks and flares.

Background Art

[0002] Fireworks are pyrotechnic devices used for aesthetic and entertainment purposes. Typically, a firework comprises an ignition device, a pyrotechnical effect and a driving charge that serves to launch the firework to a desired altitude. If used incorrectly such fireworks can cause severe injuries.

[0003] CN-203349704U describes a handheld ignition device for launching a firework. The ignition device comprises an ignition heating wire, a power circuit, an angle sensor and a control circuit to which the angle sensor is connected. This device may prevent may prevent that a firework is launched incorrectly.

[0004] However, this device is considered to be complex.

Summary of the Invention

[0005] It is an object of the present invention to provide a pyrotechnic ignition device that enables safe operation of pyrotechnic articles.

[0006] This and other objects that will be apparent from the following summary and description are achieved by an ignition device according to the appended claims.

[0007] According to an aspect of the present disclosure there is provided a pyrotechnic ignition device for pyrotechnic articles, such as fireworks and flares, which ignition device comprises a fuse member having an ignition portion and an ignition heat transmitting portion, an ignition heat receiving member arranged to receive ignition heat, e.g. in the form of a flame or spark, from said ignition heat transmitting portion for ignition of a pyrotechnic article when a movable member of the ignition device is situated in an ignition position, wherein said movable member is movable under the action of gravity from said ignition position to a non-ignition position in which said fuse member is prevented from transmitting ignition heat to said ignition heat receiving member.

[0008] The movable member of the ignition device is configured to assume the non-ignition position in use when a pyrotechnic article to which it is connected is tilted to an inclined position. The ignition device is thus configured to prevent that a pyrotechnic article fitted therewith is launched in an inclined position. The ignition device may thereby prevent that the pyrotechnic article is unintentionally launched in a direction in which it could cause injury or damage, e.g. towards a group of people, an object or a building, which means that accidents with severe injuries and/or damages may be avoided. Hence, the ignition device provides for safe launching of pyrotechnic articles.

[0009] The ignition device is configured to be connected to a pyrotechnic article, such as an aerial firework, e.g in the form of a firework rocket, a battery or a cake. Also, the ignition device may be connected to a flare to avoid that the flare is launched in a direction in which it could cause injury.

[0010] In the ignition position, an ignition path of the ignition device is unbroken, which allows launching of the pyrotechnic article fitted with the ignition device.

[0011] On the contrary, in the non-ignition position, the ignition path is broken which prevents the pyrotechnic article from being unintenionally launched in a direction that could cause injury or damage. Also, actions in which a pyrotechnic article is fired purposely in a direction that could cause injury and/or damage may be avoided.

[0012] The ignition path may be interrupted either by blocking communication between the fuse member and the ignition heat receiving member, by relative movement between the fuse member and the ignition heat receiving member or by a combination thereof.

[0013] The ignition device provides for a robust and simple solution. A cost-efficient ignition device may thus be achieved. Furthermore, the pyrotechnical ignition device is a non-electrical ignition device, which provides for a robust and cost-efficient solution. Also, the ignition device of the present invention may be fitted to a pyrotechnic article regardless of the geometrical shape thereof, which provides for a flexible solution.

[0014] Said movable member of the ignition may be a separate blocking element, such as, e.g., a disc or a ball, or a member, such as, e.g., a non-combustible tube or rod, that is connected to either said fuse member or said ignition heat receiving member.

[0015] According to one embodiment, said ignition heat receiving member comprises a separate fuse member and/or a pyrotechnic charge.

[0016] According to one embodiment, said fuse member is a first fuse member and said ignition heat receiving member is a second, separate fuse member.

[0017] According to one embodiment, said fuse member comprises black powder or a sugar-based propellant.

[0018] According to one embodiment, at least one of the first and second fuse members comprises a fuse cord with a pyrotechnic core.

[0019] According to one embodiment, a portion of said ignition heat receiving member and/or said ignition heat transmitting portion is enlarged in order to facilitate transmission of ignition heat from the fuse member to the ignition heat receiving member. Such an enlarged portion allows for tuning of the direction sensitivity of the ignition device. A smaller transmitting portion and/or receiving portion would mean that the ignition device is more direction sensitive, i.e. that it prevents ignition heat from being transmitted at a lower angle with respect to a vertical axis.

[0020] According to one embodiment the ignition de-

vice comprises a movable blocking element arranged to block transmission of ignition heat from said fuse member to said ignition heat receiving member when said movable member is situated in said non-ignition position. In this embodiment, a movable blocking element of the ignition device is thus movable under the action of gravity from an ignition position, in which the first fuse member is allowed to transmit ignition heat to the ignition heat receiving member, to a non-ignition position in which the first fuse member is blocked by the blocking element from transmitting ignition heat to the ignition heat receiving member. The movable blocking element provides for a very robust and simple solution.

[0021] According to one embodiment the movable blocking element has an aperture allowing ignition heat to be transmitted therethrough for transmission of ignition heat from the fuse member to the ignition heat receiving member when said movable member is situated in said ignition position. Such an aperture allows for tuning of the direction sensitivity of the ignition device by modifying the size of the aperture. A smaller aperture would mean that the ignition device is more direction sensitive than a larger one.

[0022] According to one embodiment said blocking element has a curved portion.

[0023] According to one embodiment said curved portion has a convex contact surface which in use rests on a concave support surface.

[0024] According to one embodiment said blocking element is disc-shaped or ball-shaped.

[0025] According to one embodiment the ignition heat receiving member forms a stop plug for holding a pyrotechnic charge of the ignition device in place. The stop plug may be received in a through hole in a wall of a pyrotechnic charge holder or in a through hole formed in the movable blocking element.

[0026] According to one embodiment said fuse member and said ignition heat receiving member are movable relative each other such that the transmitting portion of said fuse member and a receiving portion of said ignition heat receiving member are displaced from each other to such extent that ignition heat is prevented from being transmitted from said fuse member to said ignition heat receiving member when said movable member is situated in said non-ignition position. By allowing relative movement between said fuse member and said ignition heat receiving member a very robust and simple solution may be achieved.

[0027] According to one embodiment at least one of said fuse member and said ignition heat receiving member is rotatably arranged, e.g. by a spherical joint, and configured to maintain a vertical position.

[0028] According to one embodiment said fuse member is attached to a member formed from a non-combustible material, in order to remain intact upon ignition of said fuse member.

[0029] According to one embodiment said fuse member is attached to, or form part of, a substantially rigid, preferably elongated, member which is rotatably arranged.

[0030] According to one embodiment said fuse member is attached to a substantially rigid member that is formed from a non-combustible material.

[0031] According to one embodiment said ignition portion is displaced to a hidden position, in which it is prevented from being ignited, when the movable member of the ignition device is moved to its non-ignition position. This embodiment has the advantage that is is not possible, or at least very difficult, to ignite the ignition portion of said fuse member when the article to which the ignition device is connected is situated in a tilted position.

[0032] According to one embodiment, a movable blocking element is used together with a fuse member and an ignition heat receiving member that are movable relative each other, which may provide for an even more safe solution.

[0033] According to another aspect of the present disclosure there is provided a pyrotechnic article comprising such an ignition device arranged to move to its non-ignition position upon tilting of the pyrotechnic article.

[0034] The movble member of the ignition device may be adapted to move to its ignition position when the pyrotechnic article is inclined 20 or more degrees with respect to a vertical axis.

[0035] Said fuse member, said movable member, which may be a separate blocking element, such as e.g. a disc or a ball, or a member, such as e.g. a non-combustible tube or rod, that is connected to either of said fuse member or said ignition heat receiving member, and said ignition heat receiving member thus together form a safety arrangement that is intended to be used in a pyrotechnic ignition device.

[0036] These and other aspects of the invention will be apparent from and elucidated with reference to the claims and the embodiments described hereinafter.

Brief Description of the Drawings

[0037] The invention will hereafter be described in more detail and with reference to the appended schematic drawings.

Fig. 1a is a sectional view and illustrates an ignition device according to a first embodiment of the present disclosure.

Fig. 1b is a perspective view and illustrates the ignition device shown in Fig. 1a in an ignition position thereof.

Fig. 1c is a perspective view and illustrates the ignition device shown in Fig. 1a in a non-ignition position thereof.

Fig. 2a is a sectional view and illustrates an ignition device according to a second embodiment of the present disclosure in an ignition position.

Fig. 2b is a sectional view and illustrates the ignition device shown in Fig. 2a in a non-ignition position.

Fig. 3a is a sectional view and illustrates an ignition device according to a third embodiment of the present disclosure in an ignition position.

Fig. 3b is a sectional view and illustrates the ignition device shown in Fig. 3a in a non-ignition position.

Figs. 4a-4b are sectional views and illustrate an ignition device according to a fourth embodiment of the present disclosure in an ignition position.

Figs. 5a-5b are sectional views and illustrate the ignition device shown in Figs. 4a-4b in a non-ignition position.

Fig. 6a is a sectional view and illustrate an ignition device according to a fourth embodiment of the present disclosure in an ignition position.

Fig. 6b is a sectional view and illustrates the ignition device shown in Fig. 6a in a non-ignition position.

Detailed Description of Preferred Embodiments of the Invention

[0038] Fig. 1a shows a pyrotechnic article in the form of an aerial firework 1. The aerial firework 1 comprises a cylindrical container 3, a pyrotechnic effect 5 and an ignition device 7 according to an embodiment of the present disclosure.

[0039] The ignition device 7 comprises a first pyrotechnic fuse member 9, an auxiliary charge 11, a lifting charge 13 and a second, separate pyrotechnic fuse member 15.

[0040] The first fuse member 9, which has an ignition portion 9a and an ignition heat transmitting portion 9b, extends through a hole 17 in the wall 19 of the container 3 in order to be lit using e.g. an igniter (not shown).

[0041] The auxiliary charge 11, which is received in a through hole 21 formed in a curved wall 23 of a lifting charge holder 25 serves to form, prior to ignition of the pyrotechnic article 1, a stop plug that holds the lifting charge 13 in place, and facilitate, upon ignition of the pyrotechnic article 1, transmission of ignition heat from the first fuse member 9 to the lifting charge 13.

[0042] The lifting charge 13, which is received in the lifting charge holder 25, serves to ignite the second fuse member 15 and blast the pyrotechnic effect 5 of the pyrotechnic article 1 to a desired altitude.

[0043] The second fuse member 15 is arranged to receive ignition heat from the first fuse member 9, via the auxiliary charge 11 and the lifting charge 13, and ignite the pyrotechnic effect 5 at the right altitude. The second fuse member 15 thus provides a time delay. Each of the first and second fuse members 9, 15 is a burning fuse. Each of the first and second fuse members 9, 13 comprises a fuse cord with a pyrotechnic core.

[0044] In this embodiment, each of the auxiliary charge 11, the lifting charge 13 and the second fuse member 15 is thus arranged to receive, directly or indirectly, ignition heat from the first fuse member 9 and thus forms a respective ignition heat receiving member. It is however appreciated that an ignition device according to the present disclosure may have one single ignition heat receiving member, e.g. in the form of a pyrotechnic composition or a separate fuse member, which is arranged to receive ignition heat from the first fuse member 9.

[0045] The ignition device 7 further comprises a movable blocking element 27, in the form of a disc, arranged between the first fuse member 9 and the auxiliary charge 11. The movable blocking element 27 has a curved shape and is freely supported by a support plate 29 having a complementary shape. The support plate 29 is fixedly attached to a wall of the lifting charge holder 25. The blocking element 27 has a convex contact surface 31 that rests on a concave support surface 33 of the support plate 29. The blocking element 27 has a central aperture 35 which is aligned with the through hole 21 of the lifting charge holder 25 when the firework 1 is situated in a correct firing position, e.g. an upright or slightly angled position, in order to allow ignition heat to be transmitted from the first fuse member 9 to each of the auxiliary charge 11, the lifting charge 13 and the second fuse member 15.

[0046] Upon tilting of the firework 1 the blocking element 27 is free to move, under the action of gravity, relative to the support plate 29 to a position in which the central aperture 35 is not aligned with the through hole 21 of the bottom wall 23 of the lifting charge holder 25, i.e. to a position in which it blocks the through hole 21, and thereby prevents transmission of ignition heat to the auxiliary charge 11 and consequently to each of the lifting charge 13 and the second fuse member 15. The size of the aperture 35 of the blocking element 27 and the size of the auxiliary charge 11 define at what tilting angle transmission of ignition heat is prevented. Hence, upon a predetermined relative movement of the blocking element 27, transmission of ignition heat from the first fuse member 9 to each of the ignition heat receiving members 11, 13, 15 of the ignition device 7 is prevented by the blocking element 27.

[0047] With reference to Figs. 1a-1c, the function of the ignition device 7 will be described hereinafter.

[0048] Fig. 1a illustrates ignition of the firework 1 when it is situated in an correct firing position. Then, the movable blocking element 27 of the ignition device 7 is situated in an ignition position in which ignition heat from the first fuse member 9 is transmitted to the ignition heat receiving members 11, 13, 15 through the aperture 35 in the blocking element 27, as illustrated by the arrow in Fig. 1b, which causes ignition of the firework 1. Ignition heat is in this case transmitted directly to the auxiliary charge 11, indirectly to the lifting charge 13 via the auxiliary charge 11 and indirectly to the second fuse member 15 via each of the auxiliary charge 11 and the lifting charge 13.

[0049] Fig. 1c illustrates ignition of the firework 1 when it is situated in an inclined position. Then, the movable blocking element 27 of the ignition device 7 is situated in a non-ignition position in which it blocks transmission of ignition heat to the auxiliary charge 11 and thereby to each of the lifting charge 13 and the second fuse member

15. Upon tilting of the firework 1, the blocking element 27 thus moves, under the action of gravity, relative to the support plate 29.

[0050] Fig. 2a illustrates a firework rocket 101 fitted with an ignition device 107 according to a second embodiment of the present disclosure. In this embodiment, the ignition device 107 comprises a first fuse member 109 and a second, separate fuse member 115. Each of the first and second fuse members 109, 115 comprises a fuse cord with a pyrotechnic core. The first fuse member 109 has an ignition portion 109a and an ignition heat transmitting portion 109b. The first fuse member 109 is surrounded and supported by a fuse holder 110 in the form of a substantially rigid tube formed from a non-combustible material.

[0051] The second fuse member 115, which forms an ignition heat receiving member, has an ignition heat receiving portion 115a and an ignition heat transmitting portion 115b. The ignition heat receiving portion 115a of the second fuse member 115 is arranged to receive ignition heat from the transmitting portion 109b of the first fuse member 109. To this end the second fuse member 115 is at one end secured to a support frame 114 which in turn is secured to a container wall 119 of the firework rocket 101. The ignition heat transmitting portion 115b of the second fuse member 115 is connected to a lifting charge (not shown) and/or pyrotechnical effect (not shown) of the firework rocket 101 for ignition thereof.

[0052] The first fuse member 109 is rotatably arranged by means of a spherical joint arrangement 108. In this embodiment the joint arrangement 108 comprises a ring-shaped ball socket 116 which is fixedly attached to the support frame 114, and a first ball 118 which is fixedly attached to the fuse holder 110 and received in the ball socket 116. The joint arrangement 108 allows for relative rotational movement between the first and second fuse members 109, 115.

[0053] Furthermore, the first fuse member 109 is arranged to maintain a vertical position. To this end, it is provided with a plumb element 120, in the form of a second ball, which is fixedly attached to the fuse holder 110 vertically below the first ball 118. The plumb element 120 acts, under the action of gravity, to maintain the rotatably arranged first fuse member holder 110 in a vertical position. The ball socket 116 is arranged between the joint ball 118, which forms an upper ball, and the plumb ball 120, which forms a lower ball.

[0054] The first fuse member 109, which is held by the fuse holder 110, is thus arranged to move relative to the second fuse member 115 by maintaining a vertical position when the firework rocket 101 is tilted. In this embodiment, the first fuse member 109 thus forms a movable member or the ignition device 107.

[0055] Fig. 2b illustrates the firework rocket 101 in a tilted position. When the firework rocket 101 is tilted, the movable member 109 of the ignition device 107 assumes a non-ignition position in which the ignition heat transmitting portion 109b of the first fuse member 109 and the ignition heat receiving portion 115a of the second fuse member 115 have been displaced relative to each other thereby preventing ignition heat from being transmitted from the first fuse member 109 to the second fuse member 115. Hence, in the non-ignition position, the ignition path of the ignition device 107 is broken to avoid that the firework rocket 101 is launched in the tilted position.

[0056] Upon tilting of the firework rocket 101, the first fuse member 109 thus moves relative to the second fuse member 115 by maintaining a vertical position. Each of the support frame 114, and the second fuse member 115 which is secured thereto, is thus arranged to move together with a container 103 of the firework rocket 101 upon tilting of the firework rocket 101, while the first fuse member 109 is free to maintain a vertical position thanks to the joint arrangement 110.

[0057] Now referring to Fig. 3a, an ignition device 207 according to a third embodiment will be described.

[0058] Fig. 3a illustrates the ignition device 207 in its ignition position. Then, the ignition path, illustrated by arrows in Fig. 3a, of the ignition device 207 is unbroken. The ignition device 207 differs from the one described with reference to Figs. 2a-2b in that the first fuse member 209, which is held by a fuse holder 210 formed from a non-combustible material, has an enlarged ignition heat transmitting portion 209b and the second fuse member 215 has an enlarged ignition heat receiving portion 215a to facilitate transmission of ignition heat from the first fuse member 209 to the second fuse member 215. By modifying the size of the ignition heat transmitting portion 209b and/or the ignition heat receiving portion 215a, the sensitivity of the ignition device 207 may be set in accordance with predermined safety requirements and/or regulations.

[0059] Fig. 3b illustrates the ignition device 207 in its non-ignition position. In this position the first fuse member 209 has moved relative to the second fuse member 215 to a position in which transmission of ignition heat from the first fuse member 209 to the second fuse member 215 is prevented. In the non-ignition position the ignition portion 209a of the first fuse member 209 is situated in hidden position, in which a portion of the container 203 prevents it from being ignited.

[0060] Fig. 4a illustrates parts of a pyrotechnic article 301 fitted with an ignition device 307 according to a fourth embodiment of the present disclosure. In this embodiment, the ignition device 307 comprises a first fuse member 309 and a second, separate fuse member 315 which is connected to a lifting charge (not shown) and/or a pyrotechnic effect (not shown) of the pyrotechnic article 301.

[0061] The first fuse member 309 is held by a movable fuse holder 310. The movable fuse holder 310 comprises a disc-shaped portion 310a which is supported by a first support member 312 and a tubular portion 310b surrounding the first fuse member 309. A convex contact surface of the disc-shaped portion 310a rests on a concave support surface of the support member 312 which

is fixedly attached to a container 303 of the pyrotechnic article 301. The disc-shaped portion 310a is thus free to move relative to the support member 312 under the action of gravity.

[0062] The second fuse member 315 is held by a second support member 314 and arranged to receive ignition heat from the first fuse member 309 through an aperture 321 in the second support member 314, as illustrated in Fig. 4b. The second support member 314 is fixedly attached to the container 303 of the pyrotechnic article 301.

[0063] With reference to Figs. 4a, 4b, 5a and 5b, the function of the ignition device 307 will be described hereinafter.

[0064] Fig. 4a illustrates ignition of the pyrotechnic article 301 when it is situated in a correct firing position. Then, the movable member, in this case the first fuse member 309, of the ignition device 307 is situated in an ignition position in which ignition heat from the first fuse member 309 is transmitted to the ignition heat receiving portion 315a of the second fuse member 315 through the aperture 321 in the second support member 314, as illustrated in Fig. 4b.

[0065] Fig. 5a illustrates ignition of the pyrotechnic article 301 when it is situated in an inclined position. Then, the movabe member 309 of the ignition device 307 is situated in a non-ignition position in which the first fuse member 309 has been displaced relative to the second fuse member 315. In the non-ignition position, ignition heat is not transmitted from the ignition heat transmitting portion 309b to the second fuse member 315, as illustrated in Fig. 5b, but is directed towards the second support member 314. Upon tilting of the pyrotechnic article 301, the first fuse member 309 thus moves, under the action of gravity, relative to the first suport member 312 to a position in which it cannot transmit ignition heat to the second fuse member 315.

[0066] In this embodiment, the first and second fuse members 309, 315 are thus movable, under the action of gravity, relative each other from an ignition position, in which ignition heat is allowed to be transmitted from the first fuse member 309 to the second fuse member 315, to a non-ignition position in which the transmitting portion 309b of the first fuse member 309 and the ignition heat receiving portion 315a of the second fuse member 315 are displaced from each other to such extent that ignition heat is prevented from being transmitted to the second fuse member 315.

[0067] Figs. 6a-6b illustrate an ignition device 407 according to a fifth embodiment of the present disclosure. In this embodiment, the ignition device 407 comprises a first fuse member 409, a movable blocking element 427, in the form of a ball, and a second, separate fuse member 415 which is connected to a lifting charge (not shown) and/or a pyrotechnic effect (not shown) of a pyrotechnic article. The first fuse member 409 has an ignition portion 409a and a ignition heat transmitting portion 409b. The second fuse member 415 has an ignition heat receiving portion 415a and a ignition heat transmitting portion 415b. Each of the first fuse fuse member 409 and the second fuse member 415 is held by a fuse holder 410. The movable ball 427 is received in a recess 428 formed in the fuse holder 410.

[0068] The movable blocking element 427 may assume an ignition position, illustrated in Fig. 6a, in which ignition heat is allowed to be transmitted from the first fuse member 409 to the second fuse member 415, and a non-ignition position, illustrated in Fig 6b, in which the movable blocking element 427 prevents ignition heat from being transmitted to the second fuse member 415. Upon tilting of the fuse holder 410 the blocking ball 427 is thus moved under the action of gravity in a direction out of the recess 428 to its non-ignition position in which it is situated between the first and second fuse members 409, 415 and blocks transmission of ignition heat to the second fuse member 415.

[0069] It is realized by a person skilled in the art that features from various embodiments disclosed herein may be combined with one another in order to provide further alternative embodiments.

[0070] Hereinbefore, it has been described that fuse members in the form of fuse cords with a black powder core may be used. It is however realized that other types of burning fuses may be used.

[0071] Furthermore, with reference to Fig. 2a, an ignition device comprising an ignition heat receiving member in the form of a fuse member has been described. It is however appreciated that the ignition heat receiving member instead may be a pyrotechnic charge. It is however important that the ignition heat receiving member is capable of initiating a pyrotechnic article to which the ignition device is fitted. Also, it is realized that the ignition heat receiving member of the ignition device may be a charge, such as e.g. a lifting charge, or may be integrated with such a charge, of a pyrotechnic article to which the ignition device is fitted.

[0072] With reference to Fig. 2a, an ignition device comprising a first fuse member which is movable has been described. It is however appreciated that the ignition heat receiving portion, in this case the second fuse member, instead is movably arranged in order to, under the action of gravity, maintain a vertical position.

Claims

1. A pyrotechnic ignition device (7; 107) for pyrotechnic articles (1), such as fireworks and flares,

   characterized by

   a fuse member (9; 109) having an ignition portion (9a; 109a) and an ignition heat transmitting portion (9b; 109b),

   an ignition heat receiving member (11, 13, 15; 115) arranged to receive ignition heat from said ignition heat transmitting portion (9b; 109b) for ignition of the pyrotechnic article (1) when the

ignition device is situated in an ignition position, wherein
a movable member (27; 109, 110) of the ignition device (7) is movable under the action of gravity from said ignition position to a non-ignition position in which said fuse member (9; 109) is prevented from transmitting ignition heat to said ignition heat receiving member (11, 13, 15; 115).

2. An ignition device (7; 107) according to claim 1, wherein said ignition heat receiving member (11, 13, 15; 115) comprises a separate fuse member (15; 115) and/or a pyrotechnic charge (11, 13).

3. An ignition device (7; 107) according to any one of the preceding claims, wherein said fuse member (9; 109) is a first fuse member and said ignition heat receiving member (15; 115) is a second, separate fuse member.

4. An ignition device (207) according to any one of the preceding claims, wherein a portion (215a) of said ignition heat receiving member (215) and/or said ignition heat transmitting portion (209b) is enlarged in order to facilitate transmission of ignition heat between said fuse member (209) and said ignition heat receiving member (215).

5. An ignition device (7; 407) according to any one of the preceding claims, wherein the ignition device (7; 407) comprises a movable blocking element (27; 427) arranged to block transmission of ignition heat from said fuse member (9; 409) to said ignition heat receiving member (11, 13, 15; 415) when said movable member (27; 427) is situated in said non-ignition position.

6. An ignition device according to claim 5, wherein the movable blocking element (27) has an aperture (35) allowing ignition heat to be transmitted therethrough when said movable member (27) is situated in said ignition position.

7. An ignition device according to any one of the preceding claims 5-6, wherein said blocking element (27) has a curved portion.

8. An ignition device according to claim 7, wherein said curved portion has a convex contact surface (31) which in use rests on a concave support surface (33).

9. An ignition device (7; 407) according to any one of the claims 5-8, wherein said blocking element is disc-shaped (27) or ball-shaped (427).

10. An ignition device (7) according to any one of the preceding claims, wherein said ignition heat receiving member (11) forms a stop plug for holding a pyrotechnic charge (13) of the ignition device (7) in place.

11. An ignition device (107) according to any of the claims 1-4, wherein said fuse member (109) and said ignition heat receiving member (115) are movable relative each other such that, in said non-ignition position of the ignition device, the ignition heat transmitting portion (109a) of said fuse member (109) and an ignition heat receiving portion (115a) of said ignition heat receiving member (115) are displaced from each other to such extent that ignition heat is prevented from being transmitted from said fuse member (109) to said ignition heat receiving member (115).

12. An ignition device (107) according to claim 11, wherein at least one of said fuse member (109) and said ignition heat receiving member (115) is rotatably arranged and configured to maintain a vertical position.

13. An ignition device (107) according to any one of the claims 11-12, wherein said fuse member (109) is attached to, or form part of, a substantially rigid elongated member (110) which is rotatably arranged.

14. An ignition device (107) according to any one of the claims 11-13, wherein said ignition portion (109a) is displaced, when the ignition device (107) is moved to its non-ignition position, to a hidden position in which it is prevented from being ignited.

15. Pyrotechnic article (1; 101; 201; 301) comprising an ignition device (7; 107; 207; 307; 407) according to any one of the preceding claims 1-14, wherein said movable member (27; 109; 209; 309; 427) is arranged to move to its non-ignition position upon tilting of the pyrotechnic article.

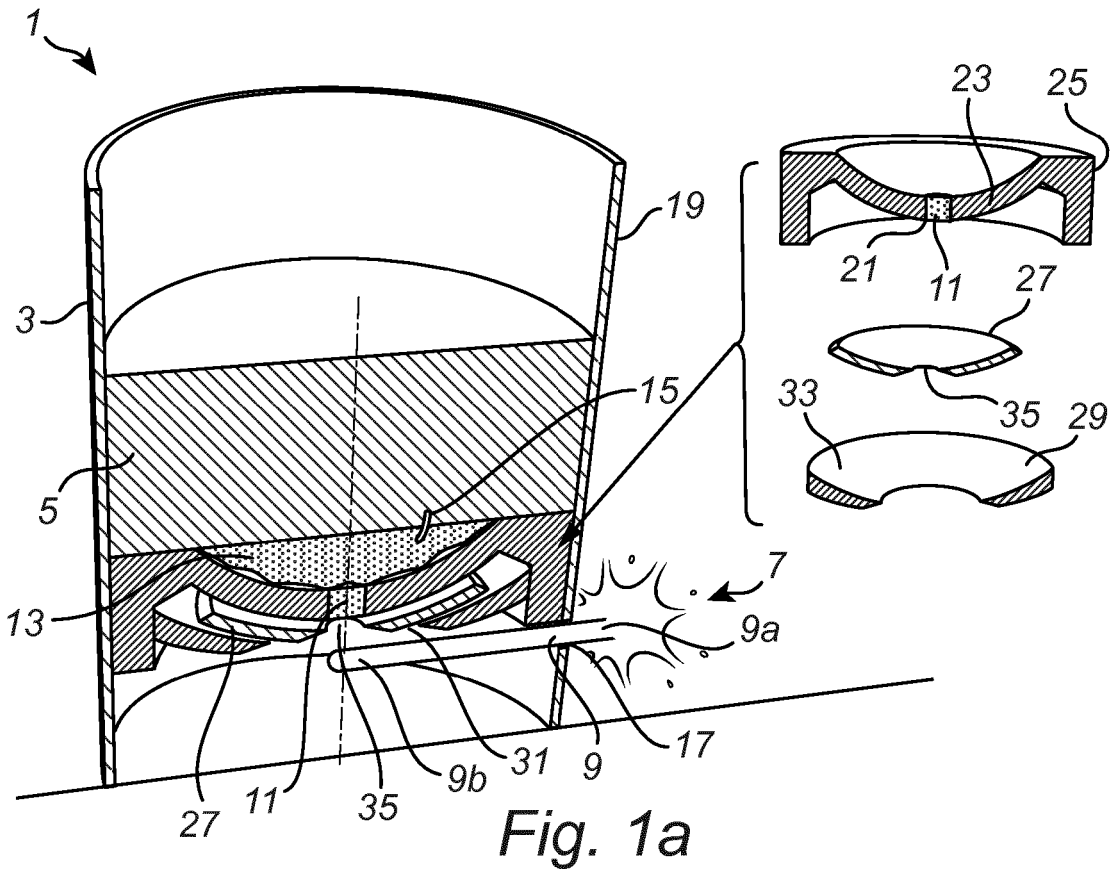
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Fig. 1a

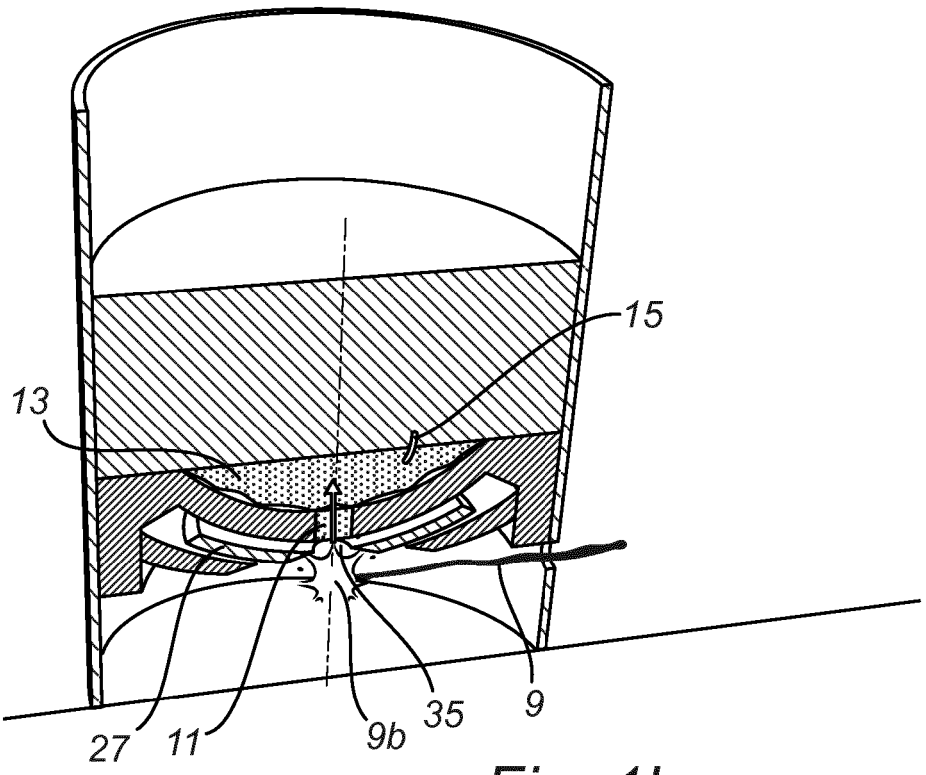
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Fig. 1b

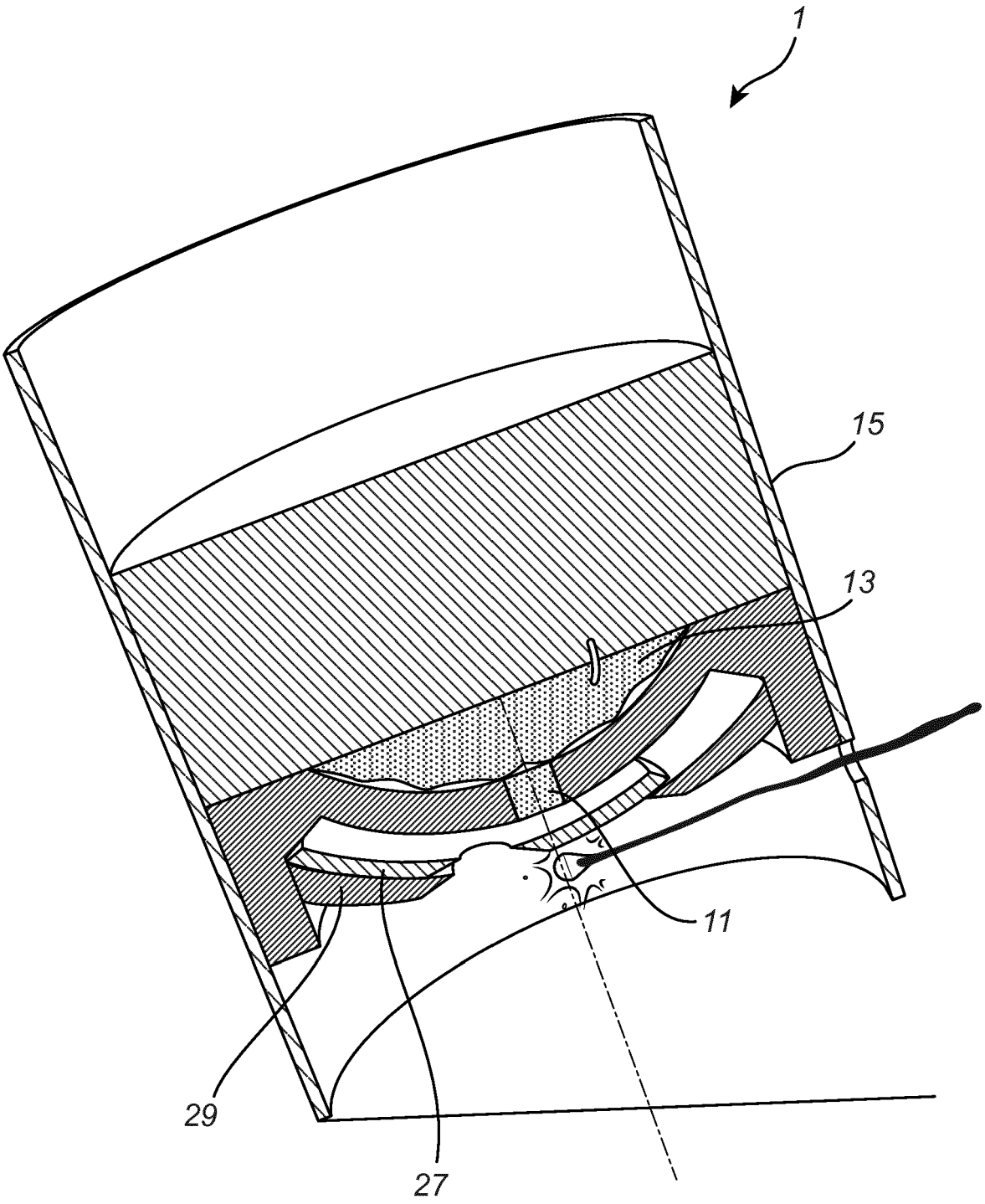

Fig. 1c

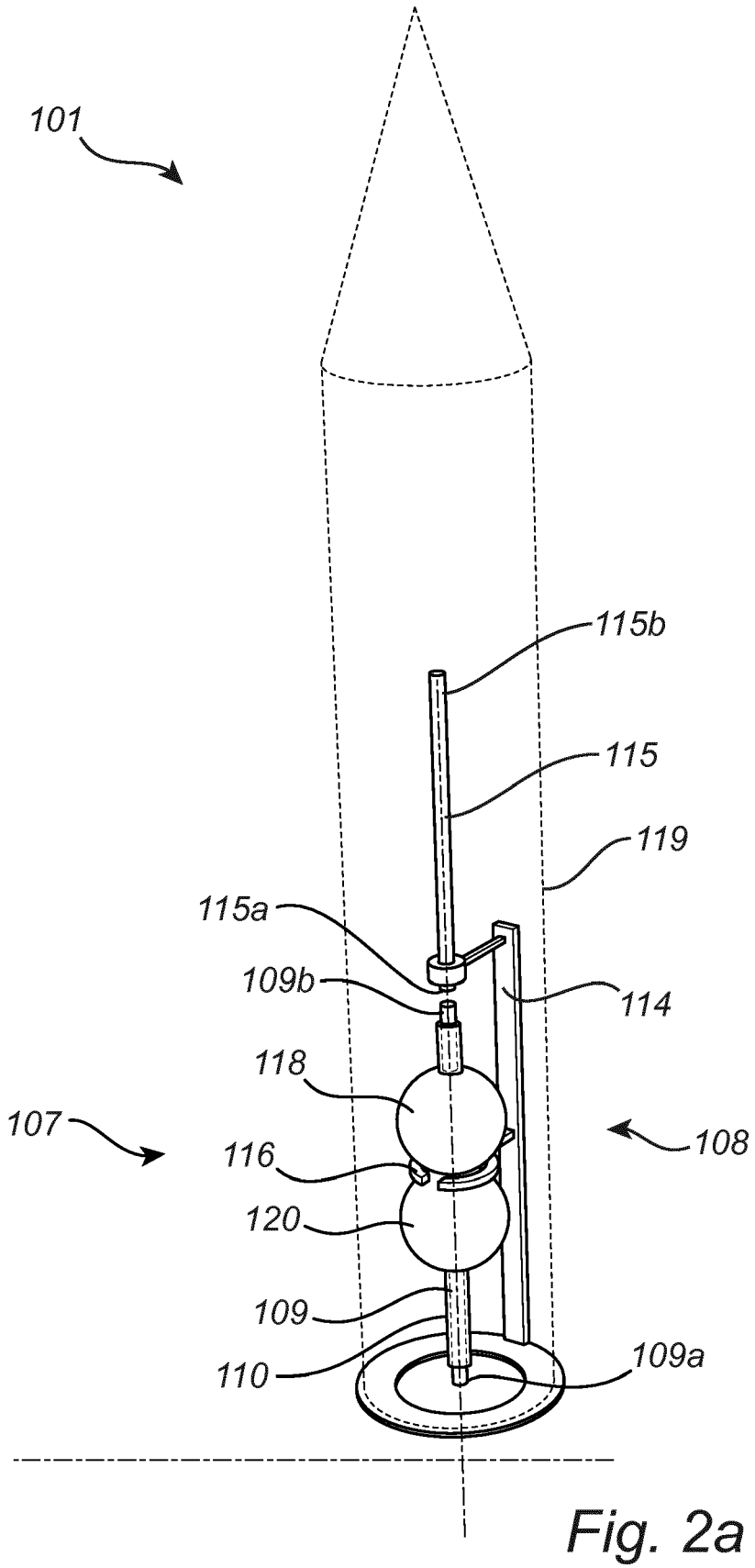

Fig. 2a

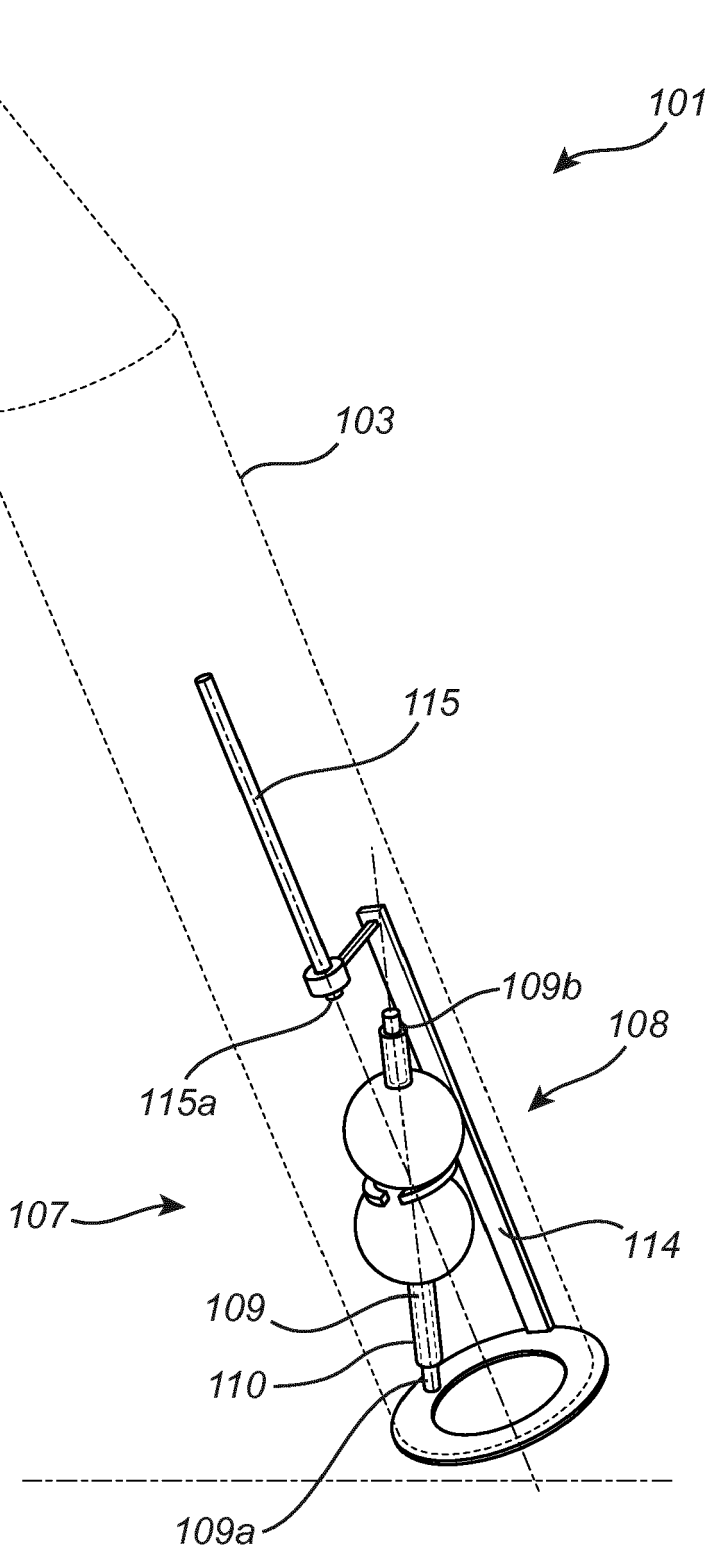

Fig. 2b

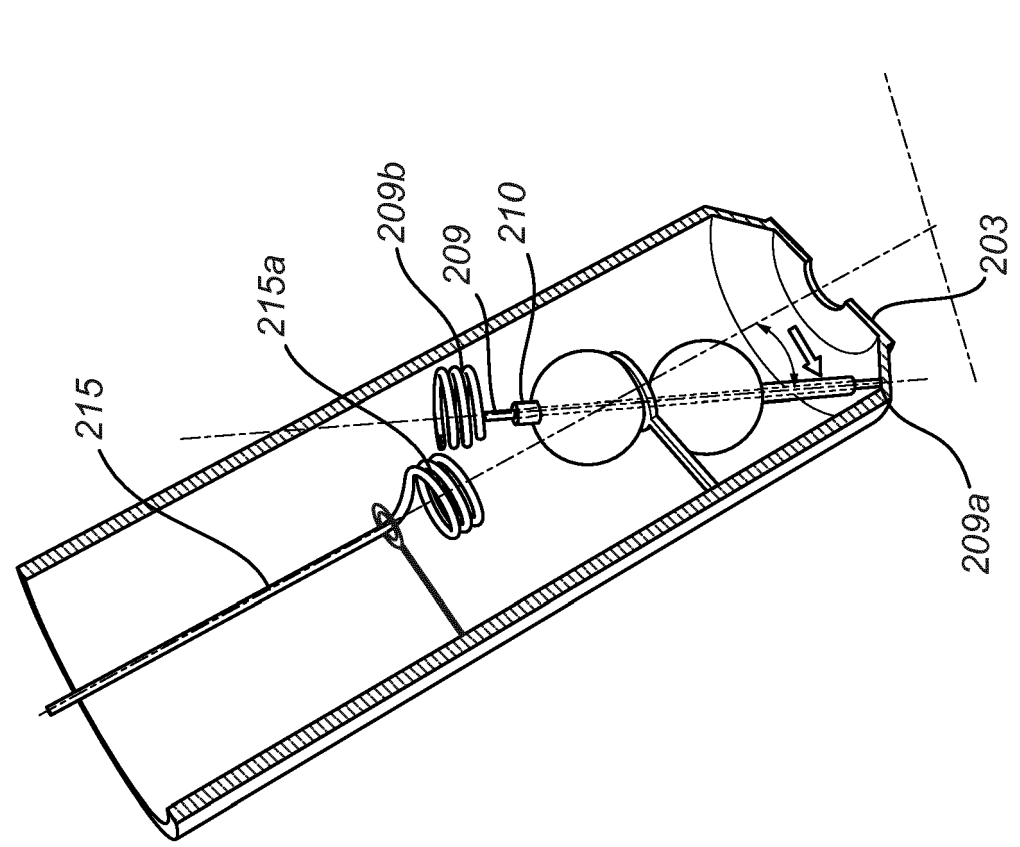
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Fig. 3b

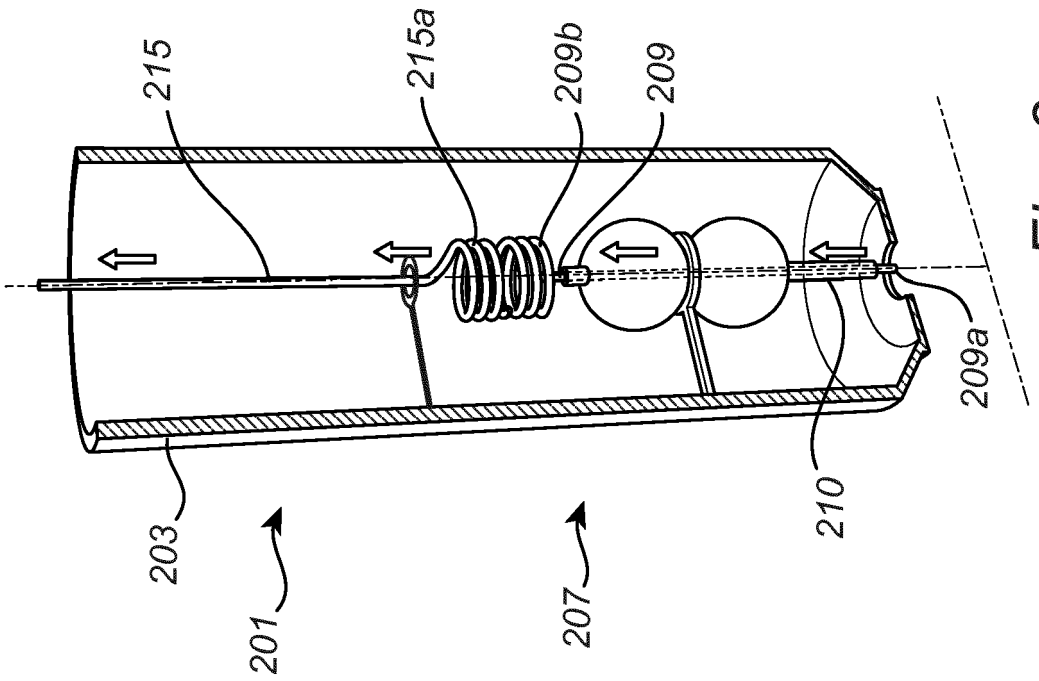
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Fig. 3a

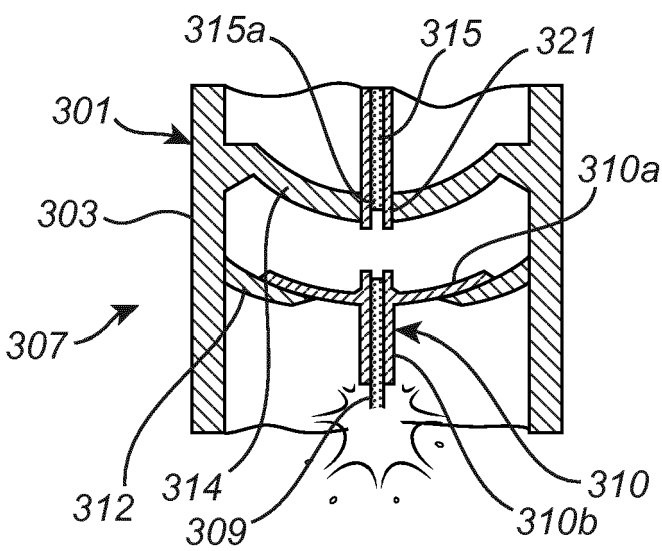


Fig. 4a

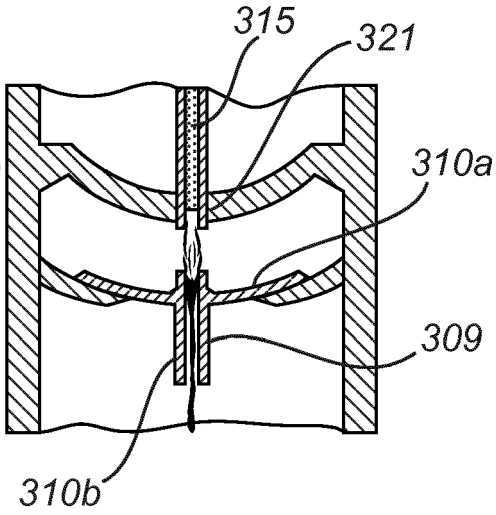


Fig. 4b

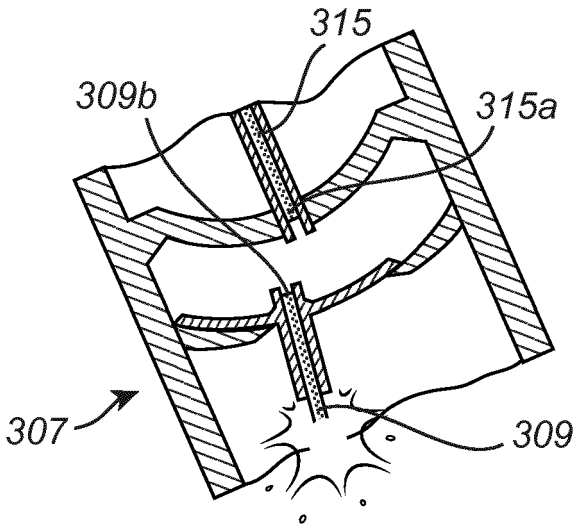


Fig. 5a

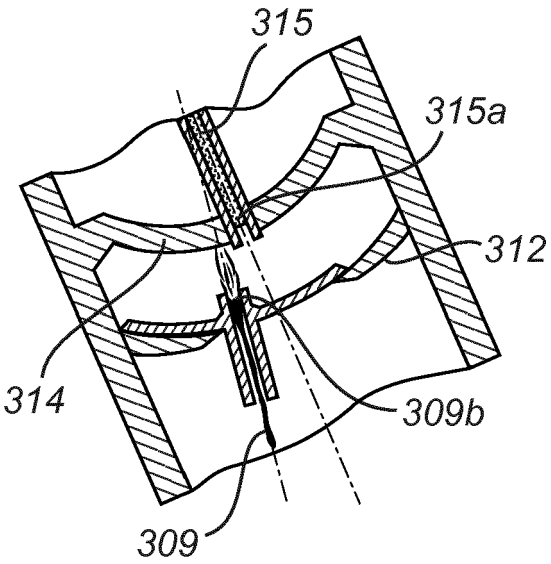
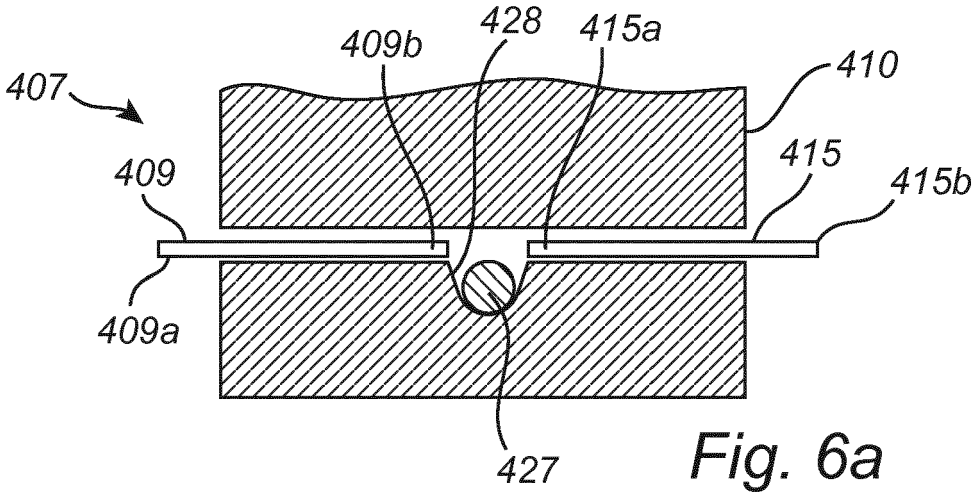


Fig. 5b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409a
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Fig. 6a

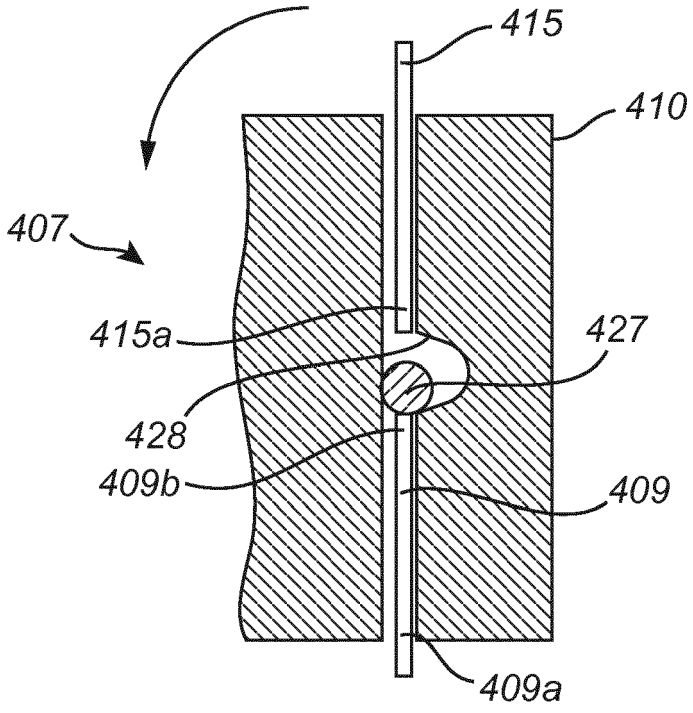
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Fig. 6b

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EUROPEAN SEARCH REPORT

Application Number
EP 18 18 3175

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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F42C
F42B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 December 2018	Gex-Collet, A

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