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(54) **Warhead with multiple effect units**

(57) The present invention refers to a fragmentable aerodynamic device comprising a body which comprises a series of gas-generating units (1, 2 and 3), each one of which has a cylindrical casing comprising a pan (4) and a closing lid (5), where there is a combustible mix (6), being the different casings axially coupled between one another, having one of the end units (3) an ignition fuse (8), where each one of the casings has an internal coaxial core (19) which is located between the bases of the casing and has an axial drill going through said bases, except for the external base of the end unit (1) which does not have the fuse (8), whose drill is designated for having a fire-transmitting mix (20); and **characterized in that** said casings have on their wall mutual coupling and fixing -means, which can be released by the pressure of the gases generated by the combustion of the transmission mix and the combustible mix contained in each casing.

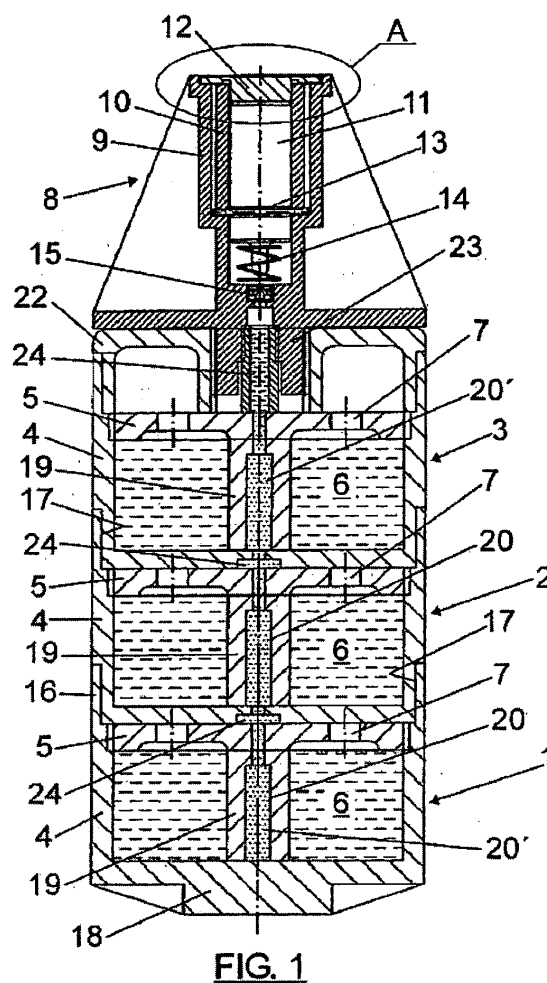


FIG. 1

Description

FIELD OF THE INVENTION

[0001] The present invention refers to a fragmentable aerodynamic device, which can be launched manually or with a firearm, and which contains substances that produce smoke-generating gases, lachrymatory gases, signaling gases, etc.

[0002] More specifically, the device of the invention comprises a cylindrical body containing a series of independent gas-generating units, coupled and axially fixed to one another, having one of the external units a fuse which can be manually or automatically activated, through firearm launching.

BACKGROUND OF THE INVENTION

[0003] There are already known smoke-generating devices like the aforementioned type, where each smoke-generating unit comprises a cylindrical casing, which comprises a pan and a lid, where the combustible product resulting from the gases is located.

[0004] The pan and the lid are usually metallic, normally made of aluminum, which increases the cost and weight of each unit and of the smoke-generating device.

[0005] On the other hand, the fixing together of the pans can pose safety problems, including the risk of accidental separation of the pans, once the device is launched, before it reaches a convenient height or distance.

[0006] Another problem of the metallic pans is that, as their nature is different from that of the other metallic components of the fuse, oxidation problems can arise.

[0007] Another problem of this type of devices is that the fire transmission, from the detonator to the furthest unit, does not occur with the desired effectiveness, with regard to the delay with which the ignition has to be transmitted from the fuse to the nearest unit, as well as to the security of the fire transmission between consecutive units and the gas generation guaranteeing unit separation.

[0008] Finally, it is necessary to point out that the known devices are usually designed in such a way that in order to launch them with a firearm it is necessary to insert them in the firearm in a specific direction.

DESCRIPTION OF THE INVENTION

[0009] The object of the present invention is to eliminate the aforementioned problems, using a device in which the casings and lids of the gas-generating units are made of plastic, for example of a polyamide or tropicalized polyamide, which enables to lower the cost and weight of the pans, as well as avoiding the risk of oxidation.

[0010] Another object of the invention is to provide the pans with means to secure the fixing between the differ-

ent smoke-generating units, preventing their accidental separation and guaranteeing that the separation between the units will only take place after shooting the device, once it reaches a convenient height or distance.

[0011] Another object of the invention is to make the device have a delay in the fire transmission, between the fuse and the nearest unit, as well as means that secure the fire transmission between the different units and their separation, once the fuse is activated and the device is launched.

[0012] In the pyrotechnic device of the invention, each one of the pans has an internal central core, which is located between the casing bases and has a coaxial drill which goes through said bases, except for the external base of the end unit which does not bear the fuse. The drill has the function of containing a fire-transmitting mix, being said mix in contact with a fire retardant device located between the fuse and the base adjacent to the unit bearing said fuse.

[0013] With the aforementioned structure it is possible to strengthen the casing of each unit, which comprises a pan and a lid, due to the internal central core located between the lid and the bottom of the pan. This core can be a part of the lid and rest on the internal surface of the bottom of the pan.

[0014] On the other hand, the coaxial drill of said internal core has parts of different sections which guarantee the fire transmission between consecutive units and enough gas generation to guarantee the separation of the different units, once the fuse is activated and the device is launched.

[0015] In the device of the invention the pan has on its wall an external peripheral recess, from the closed base, and an internal peripheral recess, from the free edge of the wall. These recesses have the same diameter and depth, so that the external peripheral recess of each unit can be coupled in the internal peripheral recess of the next unit, defining coupling means between casings.

[0016] Furthermore, the pans have on their wall mutual fixing means which can be released, once the device is launched and the fuse is activated, when the pressure of the gases generated by the combustion of the transmission mixes and the combustible contained in each casing reaches a pre-established value, which guarantees that the device reaches a convenient height or distance.

[0017] The fixing means between consecutive casings consists of small flanges and complementary housings which the pans have on their wall in coincident positions, in mutual coupling areas. The flanges protrude axially from the free edge of the wall of the pan and the housings are located in coincident axial positions from the bottom of the external peripheral recesses, having said flanges and recesses complementary end flaring finishes, whose coupling and separation requires a slight elastic strain, which is attained since the casings are made of a plastic material.

[0018] According to another characteristic of the inven-

tion, the unit having the fuse has a second lid coupled on its free edge where the fuse is mounted. This second lid has a central housing in which a core is mounted, having said core a retardant combustible mix, which will be in contact with the combustible mix filling the drill of the adjacent unit core.

[0019] As it is traditionally the case in this type of pyrotechnic devices, the fuse has a safety catch which is broken by the firing pin, during the launching of the device by a firearm.

[0020] The device of the invention is designed in such a way that it can be shot regardless of the position in which it is inserted in the launching gun. To that end the firing pin of the fuse is internally retained by the safety catch, which can be broken when the device inserted in a certain direction is shot, while it is externally locked by an airtight cover which has a weakening ring which can be broken in case the device is inserted in the gun in the opposite direction, that is to say, through the fuse side.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The attached drawings show a non-limiting example of an embodiment, which will help understand better the characteristics of the device of the invention. In the drawings:

Figure 1 shows a diametric section of a smoke-generating device comprising, according to the invention, an automatic fuse which can be activated by launching using a firearm.

Figure 2 shows a partial diametric section of a device similar to that of figure 1, with a manually activated fuse.

Figure 3 shows a diametric section of one of the intermediate pans which form the device of the invention.

Figure 4 shows a diametric section of the end pan.

Figure 5 shows a side elevation view of the upper lid of the pan on which the fuse is mounted.

Figure 6 corresponds to the detail A of figure 1, at a larger scale.

DESCRIPTION OF AN EMBODIMENT

[0022] Figure 1 shows a pyrotechnic device built according to the invention, which comprises a body which in the example represented in the drawings has three gas-generating units, which are indicated with the reference numbers 1, 2 and 3. Each unit includes a cylindrical casing comprising a pan 4 and a closing lid 5. Inside each casing there is a load 6 of a combustible product which produces smoke-generating gases, lachrymator gases, signaling gases, etc., which flow outwards through holes 7 which are in the lids. 5.

[0023] One of the end units, which in the example represented in the drawings is indicated by the reference number 3, has a fuse 8, which includes a body 9 defining

a housing for a bushing 10 which has the firing pin 11 and is externally closed by a airtight cover 12 which can be easily broken. The firing pin 11 is held in a shrinkage position by a safety catch 13, easily breakable, and by a spring 14. In the body 9 there is also a detonator 15, against which the firing pin 11 will act when it is displaced towards said detonator by breaking of the safety catch 13 and compression of the spring 14.

[0024] The effect described will take place when the device is inserted in a gun having a barrel extension, with the fuse pointing towards the exterior. Once the firearm is fired the firing pin 11 will break the safety catch 13 by inertia and it will overcome the resistance of the spring 14, impacting against the detonator 15, to cause its combustion.

[0025] The pans of the different units, except for the end unit 1, have on their wall, from the closed base, an external peripheral recess 16, as well as an internal peripheral recess 17 from the free edge of its wall, being said external peripheral recess 16 of each pan attachable in the internal peripheral recess 17 of the next pan, as it is shown in the drawings. The pan 4 of the end unit 1 lacks an external peripheral recess, in order to constitute a closing bottom 18.

[0026] The closing lid 5 of each pan is located immediately on the inside of the internal peripheral recess 17 of the wall so that the bottom of each pan rests on the lid 5 of the next unit.

[0027] The lid 5 of each pan has a central core 19 which has a coaxial drill 20, with parts having different sections, which are filled by a fire-transmitting mix 20'.

[0028] The pan of unit 3 which has the fuse 8 is closed by a second lid 22, which has a central housing on which a core 23 is mounted, having a retardant 24.

[0029] As it can be seen, the drill 20 of the core 19 of each lid goes through the lid and the bottom of each pan, so that the fire-transmitting mix 20' passes between the retardant 24 and the end unit 1, guaranteeing the ignition of all the gas-generating loads 6. The bottom of each pan 4, except for the end unit 1, has a flaring 24 capable of housing a larger amount of fire-transmitting mix, which can generate enough gases to cause the separation between consecutive units, when the device is fired.

[0030] With the described constitution, when the device is fired inserted in the barrel extension of a firearm, in the way previously described, the firing pin 11 breaks the safety catch 13 and overcoming the spring 14 resistance, impacts on the detonator 15 igniting it, which in turn causes the turning-on of the retardant 24 which is transmitted, through the fire-transmitting mix 20', to the chemical loads 6. The ignition of the fire-transmitting mix 20' in the flaring 24 causes the separation between the different units 1, 2 and 3. The gases generated by the combustion of these chemical loads 6 will flow outwards through the holes 7 of the lids 5.

[0031] The device of the invention can also include a manually activated fuse, as it can be seen in figure 2, in which the detonator 15' is ignited by the firing pin 11' by

means of the lever 26, being said detonator mounted on the body of the fuse 9'. The lever 26 can also be made of polyamide or tropicalized polyamide. As for the rest, the device of figure 2 has a constitution coinciding with the one described with reference to figure 1. The recesses 16 and 17, which have approximately the same diameter and depth, constitute the coupling means between consecutive casings. Furthermore, these casings have mutual fixing means on their wall which can be released by the pressure of the original gases by the combustion of the transmission mixes and combustible mixes contained in each casing. These means, as it can be seen in figures 3 and 4, can have small flanges 28 which protrude axially from the free edge of the wall of the pans 4 and in the complementary housings 29 which said pans have on their wall, in coincident positions, from the bottom of the external peripheral recesses 16. Both the flanges and recesses can have complementary end flaring finishes 30.

[0032] For the fixing of the consecutive casings the flanges 28 of each pan will be inserted in the housings 30 of the next pan, once they are placed in the opposite position and exerting a slight pressure, until getting the flaring 30 of the flanges 28 penetrate in the housings 29, thanks to the elastic strain which will be attained since the pans are made of plastic material.

[0033] The pan 4 of the end unit, represented in figure 4, will have the flanges 28 capable of being inserted in the housings 30 of the pan of unit 2. As for the lid 22, represented in figure 5, it will have housings 29 to receive the flanges of the pan of the adjacent unit 3.

[0034] With the flanges 28 and housings 29, there are also fixing means which prevent the different units of the device from separating. The separation of the units will only take place, once the device is fired and the fuse is activated, when the combustion of the transmission mix 20' and of the combustible mix 6 starts and the gases reach a pre-established pressure, thus guaranteeing that the device launched will reach the convenient height or distance.

[0035] As it has been previously stated, in the device of figure 1 the fuse 8 includes a body 9 which defines a housing for a bushing 10 which has the firing pin 11 and is externally closed by an airtight cover 12 which has a weakening ring 32 which can be broken, in case the device is inserted in the gun through the fuse side, due to the gases produced during the detonation of the gun when said device is launched. The breaking of the cover 12 will cause the displacement of the firing pin 11 until the safety pin 13 is broken and the spring 14 resistance is overcome, so that it impacts against the detonator causing the ignition of the retardant 24.

[0036] Thus, the performance of the device is guaranteed, regardless of the direction in which it is inserted in the gun.

[0037] The fixing means between the pans of the different casings, constituted by the flanges 28 and the housings 29 also act as fixing means between the hous-

ings in order to prevent them from rotating. These fixing means also guarantee that the different units are not separated until the necessary internal pressure is reached.

[0038] The different casings can also have on the wall, on the interior, an annular channel 33 in which an O-ring can be mounted, which results in a better seal between consecutive units.

[0039] Even though in the example described with reference to figures 1 and 2 the device only includes three gas-generating units, as it can be understood, this number can change, either increasing or decreasing.

Claims

1. Fragmentable aerodynamic device comprising a body which contains a series of gas-generating units (1, 2 and 3), each one of which has a cylindrical casing comprising a pan (4) and a closing lid (5), where there is a combustible mix (6), being the different casings axially coupled between one another, having one of the end units (3) an ignition fuse (8), **characterized in that** each one of the casings has an internal coaxial core (19) which is located between the bases of the casing and has an axial drill going through said bases, except for the external base of the end unit (1) which does not have the fuse (8), whose drill is designated for having a fire-transmitting mix (20); and **characterized in that** said casings have on their wall mutual coupling and fixing means, which can be released by the pressure of the gases generated by the combustion of the transmission mix and the combustible mix contained in each casing.
2. Device according to claim 1, **characterized in that** the pan (4) has on its wall an external peripheral recess (16), from its closed base, and an internal peripheral recess (17), from its free edge, being the lid located next to said edge and having said recesses the same diameter and depth to define the coupling means between casings.
3. Device according to claim 1, **characterized in that** the fixing means between consecutive casings consists of small flanges (28) and complementary housings (29) which the pans have on their wall in coincident positions, in the coupling areas.
4. Device according to claim 3, **characterized in that** said flanges (28) axially protrude from the free edge of the pan wall and the housings (29) are located in coincident axial positions, from the bottom of the external peripheral recesses (16), having said flanges and recesses complementary end flaring finishes (30).
5. Device according to the precedent claims, **characterized in that** the unit (3) having the fuse (8) has a

second lid (22) coupled on the free edge of its wall on which the fuse is fixed, having said second lid complementary housings (29) with the small flanges (28) of the pan (4) of the adjacent unit (3) and forms a central housing where a core (23) is mounted, having said core a retardant combustible mix (24) which is located between the fuse (8) and the drill (20) of the unit (3) having said fuse.

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6. Device according to claim 1, **characterized in that** the pan (4) and the lid (5) of each casing are made up of plastic material, polyamide or tropicalized polyamide.

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7. Device according to the precedent claims, **characterized in that** the body (9) of the fuse (8) is externally closed by an airtight cover (12) which has a weakening ring (32) for the cover breaking due to the effect of the gases produced during the detonation of the gun when said device is launched.

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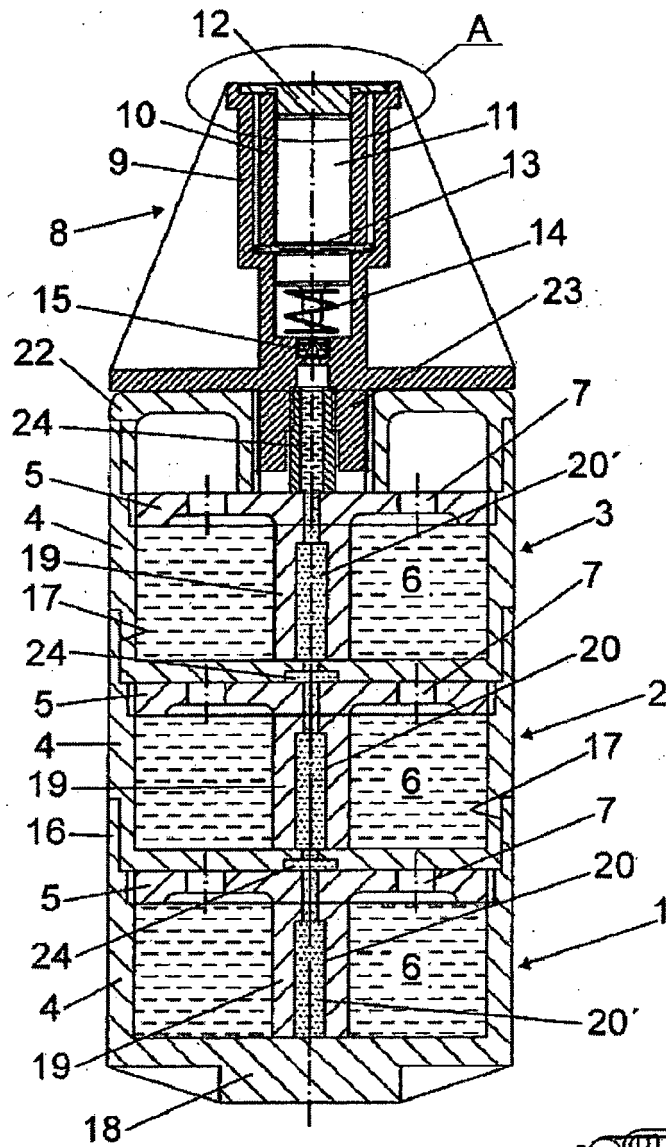


FIG. 1

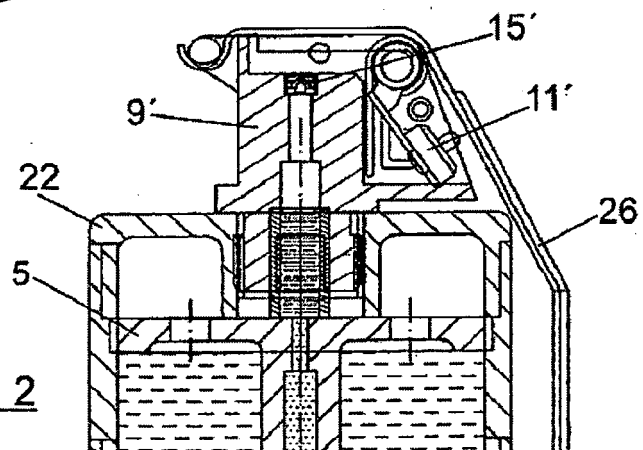


FIG. 2

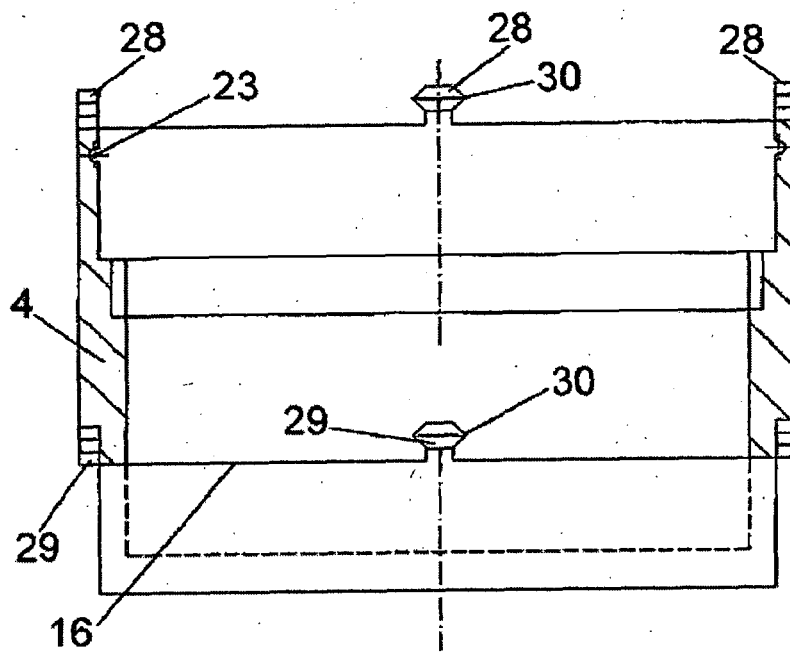


FIG. 3

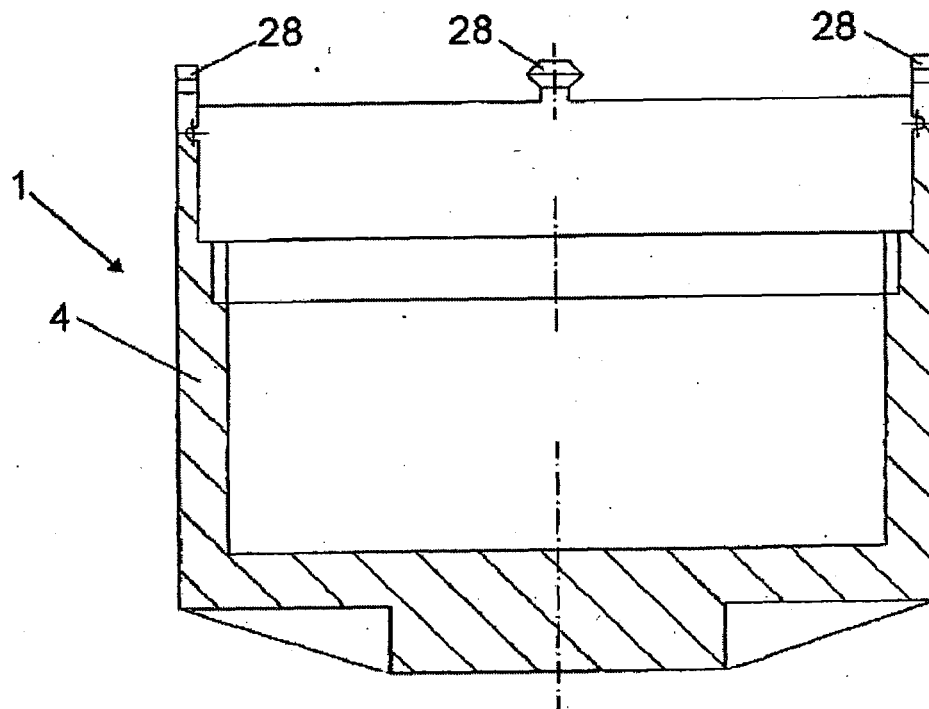


FIG. 4

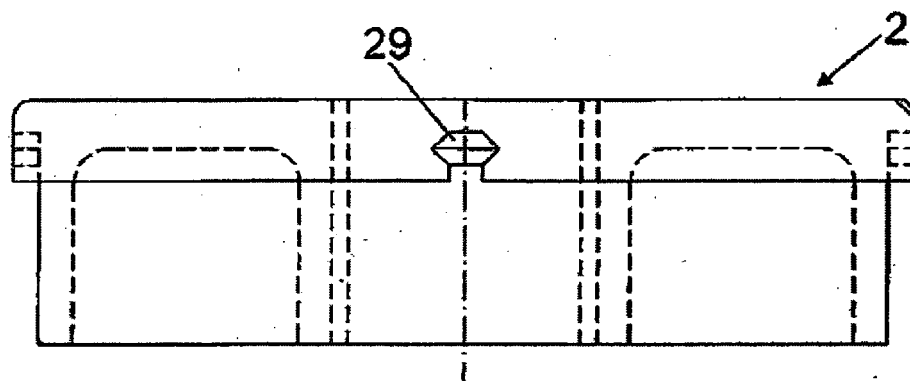


FIG. 5

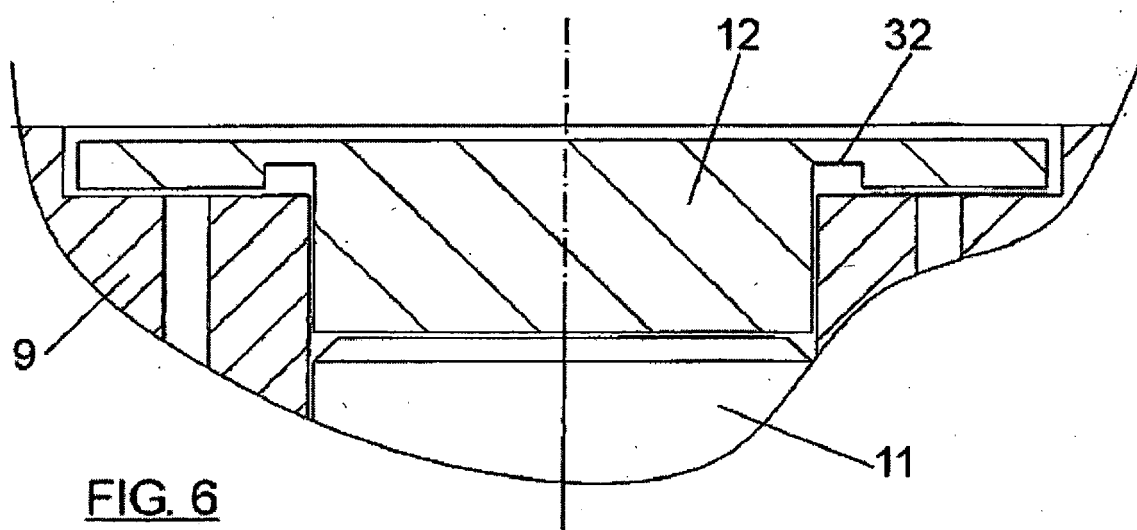


FIG. 6