



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.02.2022 Bulletin 2022/05

(21) Application number: **21187620.6**

(22) Date of filing: **26.07.2021**

(51) International Patent Classification (IPC):

F41B 11/62 ^(2013.01) **F41B 11/80** ^(2013.01)
F41B 7/00 ^(2006.01) **F42B 27/08** ^(2006.01)
F41F 1/08 ^(2006.01) **F42C 15/32** ^(2006.01)
F42C 1/10 ^(2006.01) **F42C 5/00** ^(2006.01)
F42C 9/14 ^(2006.01) **F42C 11/00** ^(2006.01)
F42C 15/42 ^(2006.01)

(52) Cooperative Patent Classification (CPC):

F42B 27/08; F41B 7/00; F41B 11/62; F41B 11/80;
F41F 1/08; F42C 1/10; F42C 5/00; F42C 9/147;
F42C 11/00; F42C 15/32; F42C 15/42

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **30.07.2020 IT 202000018565**

(71) Applicants:
• **Rossi, Osvaldo Carlo Giorgio**
31029 Vittorio Veneto (TV) (IT)

• **Napol, Giovanni**
31029 Vittorio Veneto (TV) (IT)

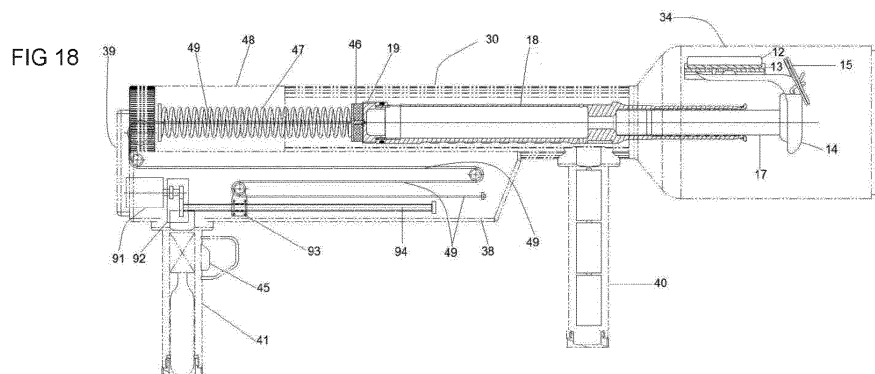
(72) Inventor: **Rossi, Osvaldo Carlo**
31029 Vittorio Veneto (TV) (IT)

(74) Representative: **Münchow, Vera Ute Barbara**
C/o Adexe Srl
Corso Porta Nuova, 131
37122 Verona (VR) (IT)

(54) **UNIVERSAL MODULAR DEVICE FOR CONTROLLED AND DISTANT LAUNCHING HAND GRENADES AND FUSES AND/OR VARIOUS HOLLOW SHAFTS WITH/WITHOUT EXPLOSIVE MATERIAL INSIDE**

(57) The invention relates to a launching device of hand grenades (10), fuses (17) for hand grenades, or a plurality of hand grenades (310, 410) carried by a retaining member (11) mounted on a substantially cylindrical hollow shaft (20) or only the hollow shaft with an ogive (24). The device comprises a tubular body (30) bearing at one end an enlarged head (34), adapted to house, respectively, said cylindrical shaft (20) and said retaining

member with the hand grenade, or the fuse, or a plurality of hand grenades, or only the hollow shaft with ogive. It further comprises a tank (36) of high pressure compressed gas or a container with a plurality of cartridges (37) of compressed gas, and as mechanical booster of the launch an elastic element, for example a coil spring (47).



Description

TECHNICAL FIELD

[0001] The present invention relates to a launching device or launcher, standardized and modular, specifically designed for the purpose of obtaining a distant and controlled launch of hand grenades (hereinafter identified with the abbreviation HG), but which can also be used for the remote launch of part of HGs, e.g., only the body of the HG (without fuse), in practice a hollow body filled with explosive material, activated by an electronic multimodal/multifunction detonator or only the fuse, pyric or electronic, of the hand grenade/HG, separated from its explosive body, and also non-lethal HG (smoke/tear/stunning flash-bang, etc., or for recreational use, e.g., Soft-Air Gaming), or also only hollow shafts/handles containing detonating material, e.g., the same supports for the hand grenades described below, in this case actuated by an additional multimodal detonator, indispensable for the detonation to occur which can be activated with different modes; more precisely, a multifunctional multimodal detonator will be indicated which can be used on the ground or at sea, in this specific case with activation according to the programmed detonation depths.

BACKGROUND ART

[0002] Hand grenades, of ancient memory and of very low cost but of high tactical effectiveness, usually have a metallic or plastic or other type of synthetic resin casing (the most modern), which can have various geometric shapes, for example: jar / ball / pineapple / vase, etc., containing explosive material therein, e.g., TNT, Compound A, Compound B, etc., to which is associated a detonator, also called a pyric fuse or, those of the last generation which are much more reliable, piezoelectric/electronic fuses, operable by the user by means of a lever, generally called "hand lever" and safety lever, secured in a rest/locking and safety position by a pull ring or similar means, called "safety pin with pull ring" before the launch, which is followed by the explosion after a predetermined time when, the safety pin having been removed, the HG is thrown by hand, thus being able to open the hand lever, pushed by an elastic element, generally a spring of various configuration, which activates the fuse, spacing it from the HG body, no longer blocked by the safety pin which, in the following, will be referred to with the sole term safety.

[0003] As in the usual and known technique, the launch can occur by directly gripping the HG with one hand, in which case relatively modest distances are reached, around 10-15 metres, and even up to 20-25 metres and beyond but only in the best throwing conditions, but very rarely obtainable on the field or in battle due to difficulties of a correct launch positioning to avoid exposing oneself to the offensive attacks of enemies.

[0004] To increase the range, about a century ago and at the beginning of 1939/40 of the last century, hand grenades were proposed with a support shaft, generally a wooden handle, housing the detonator actuating means, generally with a pull ring, in practice obtaining the leverage effect for an even more distant launch. In this case distances of around 25-35 metres and more are reached in the best conditions, which is not said, however, to be the safest for the operator on the ground. One such example is the well-known German HG "stick hand grenade" of the First and Second World War, Mod. StHG 24 (Model 24) and StHG 39, where the explosive charge, in the form of a jar with a charge of about 160 gr. and up to 200 gr. of TNT depending on the model and manufacturer, was fixed on the top of a turned, wooden, internally hollow handle, and housing the pull-cord actuation/trigger which exited from the handle when, once a threaded retention plug placed on the bottom of the same hollow handle was removed, allowed a bead fixed to a string to exit which, once pulled, activated the hand grenade.

[0005] To increase the launching distance of the common HGs and the offensive potential of these grenades/hand grenades, Italian patent application no. 10201800000012 and PCT/IB2019/050021; Italian patent applications no. 102018000003123; 102018000003125 proposed a launching means, in various variations, basically comprising a hollow shaft or hollow handle in generally synthetic material (but which could be in metallic material, wood, various pressed recovered material etc.), also this time hollow but without internal HG activation means (as in the case of the StHG 24 and the like) therefore optionally fillable with an additional explosive charge, to which a gripping hand or cage is attached for the retention of the HG, whatever the type and geometric shape. Thereby, the explosive charge possibly present in the handle is added to the explosive charge of the HG, greatly increasing the explosive power, in practice adding to the aforementioned "leverage effect" of the handle which allows a greater range, also a greater explosive charge, therefore a better tactical result.

[0006] However, the range of these HGs is always limited to the aforementioned distance of 25-35 metres in the best conditions, which are rarely obtainable in the field, unless they are used for significantly longer distances, mortars or hand grenade launchers, which are bulky and heavy as well as expensive, and therefore not suitable for transport and use in attack/incursion, defence, counter-guerilla or raking techniques also in urban environments, which are currently the most widespread operations.

[0007] In fact, in most military actions, whether of defence, attack, raking, reclamation of buildings and the like, bunkers, etc., it is useful or necessary to perform launches at a certain distance, also overcoming obstacles of a certain height, such as embankments, small buildings, trees or the like, with a Launcher which is easily transportable because it is lightweight, robust and small in size.

[0008] WO 2016/188869 A1 and WO 2017/009197 A1 disclose hand grenade launchers which use pneumatic systems to cause the hand grenade inserted into the launcher to launch.

DISCLOSURE OF THE INVENTION

[0009] The object of the invention is to overcome the drawbacks and limitations of the known launching technique, providing a launcher of grenades or hand grenades or exploding media of various types, but not limited only to these, which is hardly bulky, of low weight and therefore easily transportable, of simple and intuitive use and with parabolic ranges covering much greater distances than the common hand launch, therefore from 65-70 metres and up to over 100-120 metres, depending on the weight of the object to be launched: in practice a small portable, robust, 5bar watertight, silent mortar, therefore difficult to identify upon launching. Another object of the invention is to provide a grenade launching device which is hermetically sealed and therefore usable also in underwater incursions, with tactical exit of invaders from submarines or from SDVs (Swimming Delivery Vehicles) which are hidden and operating under the sea surface. Another object of the invention is to provide such an HG launcher which is silent and which upon launching does not leave light or smoke trails, thus favouring operators on the ground who become very difficult to trace, and which is adapted to launch any type of HG or explosive media. Another object of the invention is to provide such a launcher which is able to launch even only the fuses of the HGs placed on suitable launching means, for example the same launching means as the HGs (hollow shafts/handles with retaining members), with the explosive material of any kind or type therein, thus being able to obtain a different type of grenade with explosive material content, the quantity of which depends on the length of the launching means (hollow shaft/handle) and, therefore, the filling capacity. A further object of the invention is to provide such a launcher which is able to launch even only the fuses of the HGs placed on suitable launching means, for example the same launching means as the HGs (hollow handles with retaining members adapted to the need), with the explosive material therein, thereby being able to obtain another type of small, inexpensive but very effective "improvised" grenade or even a small but very effective depth charge, therefore with an excellent cost/benefit ratio. Another object of the invention is to provide such a launcher which is able to launch even only the fuses of the HGs placed on suitable launching means, for example the same launching means as the HGs (hollow shafts/handles with retaining members), but without any explosive charge added, for the sole purpose of acting as an "Immersed Divers Call": although a small detonation, it is in fact amplified by the water and serves to call divers to the surface within a radius of hundreds of metres. Another object of the invention is to provide such a launcher which is able

to launch even standardized hollow modular cylindrical elements, containing different explosive charges used as an alternative to HGs or fuses in land or sea operations, such as small depth charges for the prohibition of hostile divers to ports/arsenals, activated by a specific independent and calibratable electronic multimodal detonator, in the time and/or in the activation depth depending on the need. Another object of the invention is to provide such a launcher of various types of grenades which is light, small, robust, reliable and mass-produced at low cost and, if necessary, therefore disposable. Still another object of the invention is to provide such a launcher able to selectively or cumulatively launch multiple HGs (Baled Charges / Bundle of HGs / a plurality of HGs) or exploding media, arranged on a special modular shaft/support which allows the insertion of 2 or more HGs and activated by the aforementioned electronic multimodal detonator. Still another object of the invention is to provide such a launcher able to launch even non-lethal HGs, such as of the smoke, tear gas or stunning flash-bang type, or those which are completely harmless in use, for recreational purposes, in Soft-Air Gaming.

[0010] These objects are achieved by the launching device of grenades and exploding media, according to the invention which has the features of the independent annexed claim.

[0011] Preferred but in no way limiting embodiments of the invention are set out in the dependent claims.

[0012] A launching device for hand grenades can only be used essentially in a purely military field, and/or generally in the field of armed forces and police and, with some other measures, also in a recreational field, using for example, but not limited to, a special shaft or support adapted to launch recreational HGs, absolutely inert and harmless, for example in the field of Soft-Air Gaming, where HGs are used which are aesthetically completely similar to those for military use but completely inert and harmless, or with very weak explosive charge, but such as to spray a cloud of talc or to expel at large ranges a multitude of very light plastic balls of different colours also immersed in a completely harmless dye or, finally, activate a strong acoustic warning (e.g.: a siren etc.).

[0013] In the following mention will be made, for brevity and descriptive simplicity, regardless of grenades or hand grenades of any type, with the initials HG, and/or of only the Fuses of the HGs themselves, therefore specifically inherent to the military/armed forces and police, it being understood that the launcher can also be used in the recreational Soft Air Gaming as described above.

[0014] A general description of the launcher according to the invention and its ammunition follow.

[0015] A peculiar feature of this launcher device, is that it can launch, silently, therefore with the additional advantage of the difficult localization of the launch point, any explosive and non-explosive object, for example: lethal and non-lethal HGs, or other similar devices, lethal or non-lethal, at a distance much greater than that which can be obtained with a manual launch, with a parabolic

trajectory, typical of a mortar, in practice this launcher device, also for its lightness and portability, can be defined as an individual portable mortar, in fact solving a tactical problem without exposing the operator in the field who can perform distant launches even of approximately 50-70 m and up to over 120 m, depending on the weight of the object, to be launched safely and without exposing himself to the offensive attacks of enemies, therefore well beyond the distances obtainable with the hand launch alone.

[0016] Substantially, the invention has basically three variants produced with standardized and interchangeable parts for an easier and less expensive industrial reproducibility, the first of these with a sub-variant which affects only one component: the high pressure HP air tank.

[0017] Variant no. 1 with single barrel: Launcher with only pneumatic drive by virtue of a tank containing high pressure air which can be recharged, when necessary, by means of a valve on the bottom.

[0018] Sub-variant of the single-barrel launcher 1: launcher mentioned above but, instead of the standard high pressure tank, it has a container which will accommodate multiple high-pressure compressed gas cartridges/cylinders, in the case in question, present in the number of 4, so as to have a quick recharge, simply replacing, even in the field, the HP cartridges very rapidly Variant 2 with multiple barrels, in this case, with three barrels: launcher mentioned above but with 3 barrels, but not limited to only 3 barrels, always with the pneumatic drive only, but with a HP compressed gas tank of higher capacity inserted between the barrels to serve the 3 (or more) barrels, completely similar to variant 1 (the same modular components, with the exception of the smallest tank, carrying out the storage functions, always placed in the tail position).

[0019] It should be noted that the variants with 1 and 3 (or more) barrels, also have the possibility of being supplied by an external and independent compressed air source, such as a compressor for compressed air, or large high-pressure cylinders which can be found on fixed land stations, or on mobile road or naval vehicles, etc.

[0020] Variant no. 3 with single barrel: with "hybrid"-type drive, pneumatic + mechanical, with elastic pushing elements tensioned by a high torque electric motor powered by rechargeable batteries, suitably geared down and with high pressure cylinder cartridge, in combination, to increase the launch power.

[0021] The greater launch distance will be obtained, of course, with the selected combination - optionally - of pushing of mechanical + pneumatic origin through a rapidly interchangeable HP cartridge/cylinder, inserted in the handle/grip provided with a trigger.

[0022] High-pressure (HP) air is intended as compressed gas at very high pressures, and not limited to these gases, e.g.: CO₂ or nitrogen (N) etc. and, sub-variant launcher device 1 is intended as the launcher 1 having, in place of the standard or special tail HP tank made

of aluminium or "blown" technopolymer with very high resilience, a tail container with, indicatively but not limited to, 4 or more commercial or specially made HP cartridges/cylinders; the version 3 launcher device is intended as a launcher body with inserts, one or more elastic pushing elements, e.g.: rubber elastic bands or a coil spring built for this specific purpose, or two coil springs arranged coaxially or even a volute spring which, once freely compressed, when released, instantly issues a large amount of pushing energy necessary to launch an assembly composed of a hollow shaft/handle plus any explosive optionally inserted therein, an HG (lethal or non-lethal, therefore without additional explosive added in the handle), i.e., a plurality of HGs or a fuse of any type, pyric or electronic at many tens of metres away, and even over 100m.; pushing which can be increased cumulatively with a high pressure cartridge/cylinder inserted in the handle/grip which, when activated by means of the selector, pressing the trigger present on the handle / grip, frees high-pressure compressed air, as a booster, further increasing the range of that which is to be launched.

[0023] Substantially and fundamentally, the invention relates to a portable launching device of hand grenades (10), but not only those, as described above, carried by a gripping and retaining member (11) mounted on a substantially cylindrical and hollow shaft/handle (20), comprising a tubular body (30) bearing at one end an enlarged head (34), adapted to house, respectively, said cylindrical shaft (20) and said gripping member (11) with the HG (10), or other as mentioned above, and a threaded cover (35) adapted to seal said enlarged head (34) in a water-tight manner; at the other end of said tubular body (30) being fixed a compressed air tank (36) - Variant 1-, the discharge of which is controllable by means of a grip (41) with an HP cylinder inserted which is completely similar to Seltz cylinders for the operation of the rapid HP air discharge valve, positioned between the tank and the launcher body, by means of a trigger (45) mounted on the grip itself and made integral with said tubular body (30), also including a qualifying accessory and indispensable multimodal detonator to prolong the triggering time of the detonation of the HG or exploding body whatever it may be, beyond the standard prefixed time, normally about 3.5 seconds, due to the different and much longer time required to cover a greater distance or range, certainly well beyond the standard prefixed time on the common HGs since it is, therefore, an additional electronic multimodal/multifunction detonator with variable triggering time also, in the sea version, depending on the depths reached, with the particular technical features adapted to the purpose, better described in another part.

[0024] Further features of the invention will become clearer from the following detailed description, referring to its purely exemplary, and therefore non-limiting embodiments, illustrated in the accompanying drawings.

DESCRIPTION OF PREFERRED EMBODIMENT EX-AMPLES

[0025]

Figure 1 is an axonometric view of an assembly of a launching device of bombs according to the invention, in a closed safety condition;
 figure 2 is a view as in figure 1 with a front cover removed and the device ready for launch;
 figure 3 is a schematic side view of the HG launching device of figure 1;
 figure 4 is an exploded view of the device of figure 3 with a depiction of its specific ammunition: spherical hand grenade (HG) or any other type or other arranged shape, without any modification on a hollow shaft/handle;
 figure 5 is a median longitudinal section of the device of figure 3, with the spherical HG of fig. 4 inside and additional explosive in the handle;
 figure 6 is a sectional view as in figure 5 with a threaded watertight cover removed, showing the initial launch step where, the HG deprived of the safety 15: as it exits from the enlarged head 34, it is activated by natural opening and by divergence and detachment of the Hand lever 14 with respect to the body of the HG itself;
 figure 7 is a sectional view as in figure 3;
 figure 8 is an enlargement of the detail enclosed in the circle indicated with -A- in figure 7;
 figure 9 is an axonometric / schematic sectional view of the launcher sub-variant 1, where the positioning of the 4 HP / high pressure cartridges/cylinders is highlighted but of greater capacity than that inserted in the handle/grip 41, and inserted interchangeably and rapidly replaceable, in the container 37, in place of the HP monobloc tank 36;
 figure 10 is a general axonometric view in transparency, with reference to figure 9, indicating the positioning, by way of non-limiting example, of the 4 HP cartridges/cylinders in the container 37;
 figure 11 is a schematic axonometric view of a multiple-barrel Launcher or in any case with multiple barrels which are mutually integral, in this case, according to the invention, with 3 barrels;
 figure 12 is a schematic axonometric sectional view of the launcher with multiple barrels, in this case with 3 barrels, taken according to a vertical median section plane of figure 11 with inside a spherical HG placed on a hollow shaft/handle 20 with additional explosive 22 highlighted;
 figure 13 is the axonometric view of the launcher, variant 3 with pneumatic + mechanical drive with, inserted on a hollow shaft/handle with shaped retaining member adapted to retain, in this case, a standard fuse 17 for HG;
 figure 14 shows, as "ammunition" for the launcher whichever of the 3 variants it may be, a monobloc

hollow shaft/handle with integrated fuse retaining member with, merely by way of example, a standard fuse for hand grenades of a well-known North European Multinational type depicted;
 figure 15 shows in a box, as ammunition for the launcher, the fuse referred to in fig. 14 depicted -A- inserted in the hollow shaft/ handle and ready to launch (even by hand) and -B- the hollow shaft /handle + fuse assembly in exploded view;
 figure 16 shows in a box the fuse referred to in Fig. 14 inserted into the hollow shaft/handle and ready for launching, possibly even by hand, depicted -C- with inside the explosive 22 for the use of prohibiting hostile divers in ports/arsenals and -D- the hollow shaft/handle without explosive for "Divers Recall" use;
 figure 17 shows an exploded view of the launcher variant 3, pneumatic + mechanical, in its essential parts which denote a strong standardization of the parts and with, in addition, the underlying "nacelle" containing the launching mechanics;
 figure 18 shows the launcher variant 3 in a longitudinal view in transparency where a hollow shaft /handle assembly with fuse and coil pushing spring can be noted in the barrel 30, but not limited to this type of elastic element, retracted from the launch mechanism highlighted below in the "nacelle", still in safety and ready for launching but with the ring 15 still in its seat. The fuse thus depicted with hollow shaft/handle without additional explosive inside, has the main purpose of Diver Alert/Diver Recall;
 figure 19 shows the same launcher variant 3 as above, but with a hollow shaft/handle with additional explosive 22 inside, therefore its purpose will be deterrence or anti-intrusion for hostile divers in ports and arsenals;
 figure 20 shows the same launcher variant 3 as above, with elastic element, coil spring, but not limited to this configuration, extended, and with exit of the hollow shaft/handle + fuse assembly with opening of the hand lever, deprived of the safety 15, and its consequent activation as exiting from the enlarged head 34;
 figures 21 and 22 show the mechanism of pulling, locking and releasing the elastic element in the two main operating steps of charging and discharging the launching energy;
 figure 23 shows a launcher device version 1 (but it could be all three variants) with, inside, a hollow shaft /handle 20 with retaining member and ball HG shown with, screwed on the bottom, a multimodal/multifunction detonator 50;
 figure 24 shows an electronic device such as that used in home automation, but which could also be a common mobile phone, usable for activating the different functions of the multimodal/multifunction detonator 50;
 figure 25 shows the multimodal/multifunction deto-

nator 50 in detail, for general land use and sea use for underwater recall and to prohibit the access of hostile divers to ports/arsenals;

figure 26 shows, in the box, a part of the specific ammunition for the launching devices: the hollow shaft/ handle with additional explosive with the ball HG and the multimodal/multifunction detonator 50 positioned in the tail; the hollow shaft/handle assembly without HG and as such, with the addition of an ogive 24 for aerodynamic reasons for land uses, and hydrodynamic reasons in sea use also has the detonator 50 in the tail position;

figure 27 in the box, shows in side axonometric view -A- and, in longitudinal median section -B- and, in longitudinal median axonometric view -C- a launcher device sub-variant 1 carrying therein a hollow shaft 20 with explosive 22 with a plurality of ball HGs in the present case in the number of 4 and, at the opposite end, the multimodal detonator 50, and the axonometric view, by way of non-limiting example, of two assemblies -D- where, on a hollow shaft/handle, at one end there are 4 spheroidal HGs and, at the opposite end, the multimodal/multifunction detonator and 3 HGs, always of the spheroidal type with the multimodal detonator 50 at the opposite end; figure 28 in the box shows, in axonometric view -E-, a launcher device variant 3 pneumatic + mechanical with, shown in transparency, a group of 4 HGs closed in the watertight container with enlarged head 34 and threaded cover 35 tightened for a 5bar watertight seal, likewise -F-the same launcher device variant 3, pneumatic + mechanical but without the cover of the enlarged head 34 and threaded cover 35 is shown;

figure 29 shows, in the box, a launcher device sub-variant 1 -A- of which an axonometric figure is proposed with a median longitudinal section of an assembly of several hollow shafts/hollow handles of which the longest has, at the end closest to the container of the HP cartridges/cylinders, a multimodal detonator 50; an axonometric view in transparency of the enlarged head 34 and a threaded cover 35 with a front view -C- showing 5 shafts with explosive cartridges 22 inserted, assembled on the carrying shaft 20 with, in the tail position, the multimodal detonator 50 and, finally, a side view in longitudinal median section, -D- the launcher device sub-variant 1, with standardized hollow shafts/handles of two sizes 254mm/10" and 127mm/4" with various explosives therein, as a more performing alternative, to the common HGs;

figure 30 shows in a box an ammunition for all the launching devices shown here, obtained by simple combination of modular elements adapted to launch with the above launching devices and with the possibility of being additivated, in the appropriate inner space, with explosive and/or incendiary charges. More specifically, in the box Figure 30, -E- an as-

sembly of standardized elements of different sizes can be observed; -F- the hollow shaft/handle 20, with additional explosive 22, and with the multimodal /multifunction detonator module 50 in the tail position. A 1:1 functional sample of the hollow shaft/hollow handle 20 made of polycarbonate plastic (PC) for functional testing is shown -G-.

LAUNCHER VARIANT 1 and Sub-variant 1

[0026] With reference to figures 1 to 8, the launching device for hand grenades and/or fuses according to the invention has been indicated as a whole with the reference number 1, and will be described in its component parts with particular reference to the exploded view of figure 4 and the various sections;

The figures depict an HG 10 of substantially spherical shape, as many HGs in use, housed in a gripping member 11 comprising a plurality of elastic appendages 12 determining an inner cradle of a shape corresponding to that of the HG 10. The ends of the elastic appendages 12 face outwards to accommodate a strap, such as in nylon 13, adapted to retain the HG 10 in place and in absolute safety.

[0027] Of course, the HG 10 can be of other shapes as present in the various deposits/arsenals, for example: more elongated, ogival or similar, jar-shaped, cylindrical, vase-shaped, etc., in which case the elastic appendages 12 of the gripping member 11 will be correspondingly shaped to adapt to the shape of the HG.

[0028] On the opposite side to the appendages 12, the gripping member 11 has a threaded shank 16, which screws inside an open end of a hollow shaft 20, the other end of which is closed, by means of a dividing wall 21 but also with a threaded plug 19.

[0029] The shaft 20, which can also obviously serve for a manual launch of the HG 10 can optionally be filled with explosive charges 22 adapted to increase the offensive power of the HG.

[0030] The figures also show a hand lever 14 for operating the HG, blocked by a safety ring 15.

[0031] The actual launching device comprises a tubular or barrel body 30, obtained by extrusion of plastic material, or made by injection moulding plastic materials, so that longitudinal grooves are formed on its side surface in the undercut 31, Fig. 8, serving the purposes described below. The tubular body 30 has two externally threaded end shanks 32 and 33. An enlarged head 34 is screwed onto the shank 32, of such size as to house the gripping member 11 carrying the HG 10 which may also have different diameters depending on the size of the HG or the body to be launched. The head 34 is closed at the front by a screw cover 35 adapted to keep the device and its contents safe and water, dust and mud-tight before launching.

[0032] A compressed air tank 36 is instead screwed to the other threaded shank 33 which can be made of aluminium or a Technopolymer obtained by blowing.

[0033] The device also comprises two gripping handles or grips 40 and 41 mountable in an adjustable position along the tubular body 30.

[0034] As better seen in figures 7 and 8, the handles/grips 40, 41 have a series of teeth 42 above of complementary shape to the grooves 31 provided on the tubular body 30, so that they can be inserted from one end of the body 30, for example before the assembly of the enlarged head 34, and slid therealong to the desired position, where they remain blocked by simple interference or, possibly, with the aid of additional fixing means in place, such as a locking screw or gluing. The front handle/grip 40, i.e., that closest to the enlarged head 34 is made of solid material, but may be hollow both to lighten it and for a different/complementary future use, in this case serving only as a handle, while the other handle/grip 41, on the compressed air tank 36 side, is internally hollow and is connected to the compressed air tank 36 by means of a connection conduit that can also be of the flexible type 43.

[0035] A cartridge of gas (such as of the Seltz type), such as carbon dioxide or nitrogen or other gases is housed in the cavity 44 of the handle 41, the opening of the gas cartridge being controllable by a trigger 45 of the handle 41 to release the gas contained therein which, through the conduit 43, controls a pneumatic valve with rapid discharge of the compressed air contained in the tank 36 for the launch of the HG 10, with relative gripping member 11 and hollow shaft 20.

[0036] As an alternative (not shown) to the compressed gas cartridge/cylinder, in the cavity 44 of the handle/grip 41 (as in the handle/grip 40) a battery pack can be connected by means of an electrical conductor through the conduit 43, to connect to a rapid discharge solenoid valve, always arranged between the compressed air tank 36 or the container for the cartridges/cylinders 37 and the launcher body. In this case, the trigger 45 acts on an ON-OFF switch, normally open, closing the circuit with the solenoid valve with the pressure on the trigger, the activation of which causes the rapid discharge of the compressed gas and the exit of the hollow shaft + HG assembly.

[0037] Naturally, before launching, the safety closing cover 35 must be removed from the head 34.

[0038] An accidental actuation of the trigger 45 with the threaded cover 35 still in place would not allow the launch of the bomb, as the clamping force and the physical strength of the cover is greater than that of the compressed air. However, a trigger lock safety is provided, and the cover can have a red ribbon indicating the closed lock and the same cover tightened closed, thus to be removed at the moment of launching.

[0039] In the accompanying figures, the ring 15 is shown, which safely holds the hand lever 14 of the HG actuation.

[0040] Such a ring is normally removed during the arming step, since the hand lever 14 is compulsorily held in a lowered and safety position by the inner wall of the

enlarged head 34, as shown in figures 2 and 5, and is released only after the launch, as an exit from the enlarged head similar to a hopper, as shown in figure 6.

[0041] Of course, what is illustrated is only at an exemplary level, it being evident that the modes of triggering of the HG 10 or of other detonating elements contained in the hollow shaft, can widely vary: time, impact, or even a radio command in flight, for example by means of the multimodal detonator, more precisely an electronic multimodal/ multifunction detonator described below.

[0042] To improve the launch power and thus the range, 1-2 or more O-rings 25 are arranged around the hollow shaft 20 adapted to seal against the inner wall of the tubular body 30.

[0043] The launching device according to the invention can be easily gripped by the user with the two handles/grips and oriented with the desired angle with respect to the horizontal line according to the parabola and/or the range to be obtained.

[0044] Tests carried out have shown that distances greater than 100 metres can be reached, and also around 120 metres depending on the weight of the HG + hollow shaft/handle with explosive added: in a test carried out with a total launched weight of about 650 grams there was a maximum range of 122 metres with impact detonation (launcher variant 1).

[0045] The overall length of the launching device variant 1 and sub-variant 1, according to the invention, does not normally exceed about 550 mm and the weight, including the HG with hollow shaft and auxiliary charge, is around 5.5-5.9 kilograms, thus being extremely manoeuvrable and easily transportable, in maximum safety, even in restricted environments, such as armoured, aerial and/or naval vehicles, especially small assault and submersible units, even submerged, with hostile divers exiting from the notoriously very narrow floodable diver escape/entry sentry box.

[0046] The launching device according to the invention is 5bar watertight and can therefore be used in any marine environment for diving as well as terrestrial, sandy or rocky environments, even with extreme operating climates, from -30° to +55°C, and shockproof because it is made of a technopolymer which is extremely resistant to impacts and thermal shocks.

[0047] The launching device according to the invention is used in attack actions with curved shot even on embankments/buildings up to 10-15 metres high; in territory control or raking actions; in building reclamation actions, etc.

[0048] All the components of the device are made of high resilience technical plastic material (technopolymers) in particular, e.g.: PC, or ABS+PC, with the exception of the compressed air tank 36 which is normally in aluminium even if a tank in a technopolymer produced with the technology of blowing highly resistant plastics is envisaged in the future. As mentioned, the tubular body 30 is preferably obtained by drawing but could also be produced by injection moulding with very particular

moulds with very high technology, while the enlarged head 34, the threaded cover 35 and the handles 40 and 41, by injection moulding.

[0049] It should also be noted that the operating tests were carried out with launcher elements made using 3D Sampling/3D Modelling technology with technopolymer plastic material and that, therefore, for low productions especially for testing purposes but not only, this production technology can also be considered instead of the much more expensive extrusion/drawing technology (finned tubular body 30) and injection moulding which requires expensive high-technology steel moulds but, it should be noted, 3D Sampling/3D Modelling cannot in any way offer the same degree of resilience which extruded and/or injected technopolymers can offer. As a further safety, a shrink film which locks the retention safety and which is engraved manually, for example by pulling the ring 15 before the launch, can optionally be provided on the gripping member 11 which retains the HG 10.

[0050] For further clarification regarding sub-variant 1, figure 9 always depicts the single-barrel launcher but in sub-variant 1 which differs only for the rear part and, in particular, the one which replaces the tank 36 with the container 37 which houses 4, but not limited only to 4, High Pressure Cartridges/Cylinders inserted in a removable plate with protrusions/appendages or retaining fingers, to facilitate the retention and rapid exchange of the Cylinders when discharged. Figures 9 and 10 also show, as a demonstration of the absolute possibility of the use of any and all HG present today in the various World Arsenals, an HG other than the spherical one previously described in Fig. 4 inside the launcher, which has a "bottle" shape and with a piezoelectric fuse typical of a Spanish manufacturer.

LAUNCHER VARIANT 2

[0051] Figures 11 and 12 illustrate a multiple launcher with 3 barrels, indicated with the reference number 100, in which several launching devices 1 (in the example shown in the number three) substantially identical to that shown in the previous figures, are carried by the same pair of handles/grips 40 and 41.

[0052] In this case, between the various devices and the 3 (or more) barrels an aluminium cylinder for HP compressed air calibrated up to over 200bar 101 is arranged, with a reducer/pressure regulator (not shown) for multiple launches, single or multiple salvo which, through connections 102 goes to feed the storage tanks 36 in this case, however, smaller than Version 1, of the various launch barrels 30.

[0053] A selector (not shown) is provided to selectively trigger the various devices by actuating the trigger 45 (single shot), or actuating the selector can cause the simultaneous launch of all devices/barrels with a salvo of all 3 hollow shaft/handle assemblies (+ any additional explosive inside) plus HG or other.

GENERAL OPERATION OF VARIANT 1, SUB-VARIANT 1 AND VARIANT 2 OF HP PNEUMATIC TYPE

[0054] As already explained, the operation is based on the pushing of high-pressure compressed gases where, in the launcher variant 1, a modular and interchangeable integrated tank 36 is used, fixed on a barrel 30, to launch, by way of example, an assembly composed of a hollow shaft/handle 20 with, optionally, additional explosive cartridges 22 inside and, retained by special retaining members 11-12, any HG, here a spheroidal type HG 10 depicted: by pressing the trigger 45, after removal of the threaded and watertight cover 35, from the enlarged head 34, a rapid discharge valve is activated, driven by a commercial cartridge/cylinder (such as those of Seltz type) inserted inside the handle/grip 41 or, alternatively - not shown - by a solenoid valve powered by batteries, possibly inserted in the handle 40 which, opening, launches a powerful jet of high-pressure compressed air which expels the hollow shaft/handle plus HG assembly at a remarkable distance with a curved/parabolic mortar-type launch depending on the launch angle, in this case very light, watertight and portable, with a very low-cost ammunition.

[0055] The sub-variant 1 operates and behaves in exactly the same manner as the variant 1, since the only difference is given by a different type of tank 37, better identifiable as a container illustrated in Figures 9-10 of the same shape as the tank 36, but with 4 or more high pressure cartridges/cylinders inserted, for faster recharging, with the simple replacement of the cylinders themselves which can be carried out very quickly and safely also in the field.

[0056] Variant 2 is fundamentally similar to variant 1 and sub-variant 1 in that the principle of exploitation of high pressure compressed air is always in operation for the more distant launch of a lethal/explosive object as described above and/or different assemblies described below, or even non-lethal (tear gas/stunning HG, etc.) but, in this specific case, there is the advantage of having more barrels, compared to the single barrel 30 of variants 1 and sub-variant 1, allowing a plurality of salvos for a better area saturation where necessary.

[0057] In the example of Figures 11 and 12, a THREE-barrel launcher 30 (but it could be 2-3-4 or more barrels) is depicted arranged, seen in a master cross-section, in a triangle for better portability even in the narrowest spaces of assault vehicles with, positioned therein, a High Pressure compressed air/Compressed gas tank in Aluminium 101 which, through the conduits 102, carries the compressed air in the smaller storage tanks 36 placed at the opposite end of the enlarged head 34 and threaded cover 35.

[0058] By pressing the trigger 45, after acting on a selector (not shown), the quick discharge valves of the various barrels 30 can be activated, exactly as in variant 1 and sub-variant 1, selectively or simultaneously for the launch of one or more assemblies composed, for exam-

ple, of a hollow shaft/handle 20 (with/without additional explosive 22) retaining members 11 and 12 and spherical HG 10 as depicted in the axonometric view in longitudinal median section 12. The possibility of a salvo with 3 shots (or more if more barrels) in a sequential manner or in a single time, allows a better area saturation and therefore a better tactical result.

[0059] Obviously more cumbersome than variant 1 and sub-variant 1, the multi-barrel variant 2 finds valid use on light armoured vehicles or light naval vehicles which can embark even larger compressed air/gas cylinders calibrated even above 200 bar, for a continuous recharging of the central cylinder of variant 2 always through a pressure reducer to be placed in line.

VARIANT 3 Hybrid Pneumatic + Mechanical

[0060] The hybrid variant 3 uses a good part of the standardized components of the variant 1, sub-variant 1 and variant 2 but, unlike these has, in addition to a pneumatic component (given by an HP air cartridge/cylinder inserted in the handle/grip 41 which is easily replaceable, when discharged, with a new full one), also a mechanical pushing component provided by elastic elements, for example elastic bands, single or double coaxial coil or volute springs, with space saving, which have the purpose of pushing that which is inserted in the barrel 30 outwards with the maximum pushing energy, sufficient for an incomparably more distant launch than the traditional launch by hand.

[0061] In the axonometric figure 13, in figure 17 and in figure 18 the strict derivation from variants 1 and sub-variant 1 is clearly notable for the standardized components (barrel 30 enlarged head 34, watertight threaded cover 35, handles/grips 40 and 41, etc.) with the addition of a "nacelle" 38 below the barrel 30, containing the drive mechanics composed, very simply, of a high torque electric motor 91, powered by a series of commercial batteries inserted in the handle 40, with relative gear reducer box 92 which drives a worm screw 94 on which a carriage 93 slides to which is connected - through a clearance of several pulleys (wheels with a hollow for housing the metal wire) 193, which on the towing carriage highlighted in figure 21 and figure 22, a high-strength steel cable 49 of a diameter not limitedly of about 0.8 mm fixed, crossing longitudinally and in a central position a coil spring 47, one end to the four-lobed pushing plate 46 (to facilitate the passage of HP compressed air) with a spike and, on the other end to any fixing and locking point in the "nacelle" 38 below the barrel 30.

[0062] Figure 18, figure 19 and figure 20 show, by way of non-limiting example, an elastic pushing element consisting of a common steel coil spring 47 or, as a possible alternative, two coaxial springs (not illustrated), or a volute spring, or rubber elastic bands (not illustrated). For clarity, convenience and descriptive brevity, it has been chosen to illustrate a single normal steel spring 47 as illustrated in figures 18, 19 and 20.

[0063] In the hollow handle/grip 41 where the trigger 45 is also placed, there is a cartridge/cylinder at high commercial pressure which, in this specific case, if activated by a two-position selector (not shown) and by the trigger 45 can operate as a rapid discharge of high pressure air for the launch of that which is inserted in the barrel 30, in the configuration shown an assembly composed of a hollow shaft/handle with integrated retaining members and integral parts in the same which retain a fuse for HG in place. The model of the fuse 17 depicted with the two spacers 12 and 13 on the hand lever 14, inserted by restraint one into the other, is that produced by a well-known North-European multinational.

[0064] Since this assembly - hollow shaft/handle + fuse - under examination is very light (about less than half of a hollow shaft/handle assembly with or without explosive material inside with an HG regardless of the model, and with an average variable weight of only the HG of 350 ->500gr.), the discharge of high pressure air from the HP cartridge/cylinder is sufficient for a very distant launch of this assembly, approximately 45-55 m; if the elastic element (in this illustration the spring 47) is also to intervene in the launch, the pushing generated by the coil spring 47 added to that released by the cartridge/cylinder inserted in the hollow shaft/handle 41, as a "booster", allows launches well above 100 m depending on the total weight of the object launched.

[0065] The advantage of a hybrid launcher (pneumatic + mechanical), in addition to being lighter and more compact than variants 1, sub-variant 1 and variant 2, is that it has a considerable pushing which could further increase with the use, as an alternative to the single coil spring, of a pair of coaxial springs and that of allowing repetitive launches, theoretically more than 6-8 launches per min (just enough time to bring the spring back into compression after a launch), also at a great distance with the help of HP cartridges/cylinders as boosters, easily and quickly interchangeable when needed, for an increased pushing and always with a high degree of silence, a fundamental requirement for the safety of operators in the field.

OPERATION OF THE Hybrid LAUNCHER VARIANT 3.

[0066] Considering the spring 47 extended in the rest position, in order to load it and compress it so that it can release its pushing energy, it is necessary to act on the switch/contact normally open at rest -P- positioned on both sides of the "nacelle" (right and left) just ahead of the trigger 45 so that the index finger of both the left hand (for those who are left-handed) and the index finger of the operator's right hand when in the safety position, avoids inadvertently and accidentally pressing the trigger 45 (as in use when handling loaded weapons), at the same time he has the possibility of pressing the button - when required - which gives the consent to activate the high torque electric motor 91 which, through the gear reducer box 92, rotates the worm screw 94 on which the

carriage with pulley 93 operates which, by pulling back, pulls the steel cable 49 which, when under tension, makes the spring 47 retract until the carriage 93 touches the microswitch/limit switch IN1- which stops the motor: the spring 47 has reached the maximum compression useful for launching.

[0067] As the trigger 45 is pressed by means of a simple lever (not shown), the two bronze compression bars 931 are opened by divergence, which compress, when tightened, the two faces 932 of the carriage 93, where a portion of the female thread which interfaces with the male thread of the worm screw 94 is obtained, indicated in figures 21 and 22, dragging the carriage 93 which can slide very quickly, towed by the spring 47 which extends, pushing violently out through the four-lobed plate 46 with a spike, the hollow shaft/handle assembly with a fuse contained in the barrel 30. The carriage 93 then stops on the stop block located inside the "nacelle" 38, also acting simultaneously on the microswitch/limit switch -IN2- which, remaining closed on the pressure of the carriage at stroke end, allows the restart of the electric motor 91, if the normally open button P is pressed, which closes an activation circuit and, at the same time, the two bronze compression bars 931 automatically return to close, tightening the carriage 93 again acting on the two faces 932 on the worm screw 94, so as to be able to drag the carriage 93 again - so as to tension the cable 49 - which compresses the spring 47 again, until touching the microswitch/limit switch IN1 which stops the motor with the spring tensioned and ready for a new launch.

[0068] The carriage 93 is in any case guided by the fins 933 placed on both sides of the carriage itself, which are inserted into the guides in PFA/Teflon 934 (to facilitate their sliding), so as to always remain centred on the worm screw 94, despite the violent forwards movement when freed from the worm screw 94 itself.

[0069] The carriage 93 is composed of two steel plates 930 with a convex shape 932 at the bottom which carries therein a female thread which matches the male thread of the worm screw 94 held together, but normally separated, by some pins with antagonistic springs 935 therein which always keep the two faces of the plates pushed outwards so that, only when the bronze pushing/block bars 931 are pressed on the external faces of the convex shapes 932, the worm screw 94 can engage and act in rotation, dragging the carriage 93 at stroke end. A pulley 193 is fixed to the top of the carriage 93, in whose throat the cable 49 for tensioning the spring 47 slides as shown in figures 21 and 22.

MULTIMODAL DETONATION MODULE (ELECTRONIC FUSE)

[0070] When launched, all HGs generally have a prefixed triggering time which ranges from 3.5 to 4.5 seconds, therefore completely insufficient time because, when launched, the HG travels in flight, if a distant shot is desired, a distance greater than that obtainable with

the traditional launch by hand, as is known.

[0071] Hence the need to adapt the triggering time of the HG as a function of the launch modes, the distance to be travelled towards the target or, if particular tactical effects are to be obtained, for example an aerial detonation (Overhead Burst) on command, in order to hit enemies from above (e.g., hidden behind embankments or natural/artificial obstacles), then it is necessary to intervene on the detonation modes, releasing these from what is set on the HG in the factory.

[0072] Figure 23 is a median sectional view of a launching device of hand grenades according to the invention, complete with an additional multimodal/multifunction detonation module or unit 50, fixed to the hollow shaft or handle 20 supporting the HG 10;

figure 24 is a schematic view of a transmitting unit 500, for non-limiting example, of home automation derivation usable with the multimodal launching device according to the invention; figure 25 is a sectional view of only the additional multimodal/multifunction detonation module 50;

figure 26 shows in a box, respectively, a side view -A- and a longitudinal section view -B- of an HG 10 with its supporting hollow shaft 20 and additional multimodal/multifunction detonation module 50;

[0073] With reference to figure 23, the HG launching device according to the invention has been indicated as a whole with the reference number 1 and comprises a tubular body or barrel 30, having two externally threaded end shanks 32 and 33, on which an enlarged head 34 closed at the front by a screw cover 35, and a tank of compressed air/compressed gases (e.g. CO₂ or Nitrogen, etc.) 36 are respectively screwed.

[0074] The tubular body 30 bears a pair of handles 40 and 41, of which the front one 40 closest to the enlarged head 34 serves only as a grip; the other handle 41, on the side of the compressed air tank 36 bears a trigger 45, which controls the discharge of the compressed gas into the tank 36. A hand grenade 10, which merely by way of example in the accompanying figures is shown as a spherical shape, is carried by a gripping and retaining member 11 provided with a threaded shank 16 (see in particular figure 5) which screws inside the open end of a hollow shaft 20, the other end 21 of which is closed.

[0075] The hollow shaft/handle 20 can also serve, of course, for a manual launch of the HG 10, and is additionally filled with explosive charges 22 (explosive compounds of various kinds and types) adapted to increase the offensive power of the HG, regardless of the type or model. According to the invention, an additional multimodal/multifunctional detonation unit or module 50 is mounted on the part of the closed end 21 of the hollow shaft 20, which will be better described below, having an externally threaded shank 51, adapted to screw inside an extension of the hollow shaft/handle 20 beyond said end and closed by the wall 21 to avoid damaging the possible explosive 22 present inside which, recommended for obvious safety measures, will be presented in the form of

prepackaged cartridges.

[0076] The assembly shown in figures 23 and 26, consisting of the HG 10, the hollow shaft 20 and the additional multimodal/multifunction detonation module 50, is housed in the launching device (here shown in variant 1) as shown in figure 23; in particular the hollow shaft 20 and the additional multimodal/multifunction detonation module 50 are housed in the tubular body 30, with the multimodal/multifunction detonation module 50 itself arranged near the compressed air tank 36, while the HG 10 is housed in the enlarged head 34.

[0077] Of course, the hollow shaft/handle 20 can have different sizes (lengths). For the case shown in figures 23 and 26, in which two explosive charges 22 are provided, the length of the prototypes made is 254mm/10" for a standard diameter of 33 mm. Other prototypes, which are modular/standardized and integrable with each other, have been made for exactly half the length of the hollow shaft/handle 20, i.e., 127mm/5", with only one of the explosive charges 22 shown in the figure, and also in the 190.5mm/7.5" version, the explosive charges are recommended, as already mentioned, to be in the pre-packaged cartridge type also for safety and ease of handling.

[0078] The tubular body/barrel 30 of the launching device can be adapted correspondingly to the length of the hollow shaft 20 of 254mm/10" complete with an additional multimodal/multifunctional detonation module 50, or can be maintained in the standard length by appropriately filling, with adapter shafts of length as described above, the inner empty space of the tubular body 30, in the case of use of hollow shafts of lesser or different length.

[0079] The additional modular/multifunction detonation module 50, better shown in figure 25, comprises a cylindrically shaped high-resistance technopolymer plastic body with knurled outer surface for better grip.

[0080] Starting from the screwing shank 51 at the end of the hollow shaft/handle 20, inside said module body 50, an explosive charge 60 is contained for the detonation of the compounds 22 contained in the hollow shaft 20 and the HG 10. Any empty space between the explosive charge 60 and the closed end part 52 at the shank 51 is filled with a polyurethane spacer 53, or alternatively also with steel micro-spheres to increase and ensure the chain detonating effect.

[0081] The hollow explosive charge 60 internally incorporates a micro-resistance 61 which bends when crossed by current, triggering a micro-detonator 62, e.g., in mercury fulminate or other primer, which in turn detonates the hollow charge 60 and, thereafter, triggering the chain detonation of the explosive charges 22 and HG 10, greatly improving the tactical effect.

[0082] Downstream/behind the hollow charge 60, a trivalent or trimodal electronic circuit 70 is arranged for the activation of the micro-detonator 62, connected with electrical conductors 71 to the micro-resistor 61 which, upon command, becomes incandescent by triggering the micro-detonator 62 and the hollow charge 60.

[0083] The trimodal electronic circuit 70, which serves as an independent detonator/trigger of the HG 10, is designed to operate in different modes:

a) Detonation activation with adjustable timing from 5 to 10 seconds (the time when the hollow shaft + HG assembly is in flight or reaches the target) and by percussion/impact of the HG on the ground or against a solid or semi-solid obstacle (when, for example, the hand grenade is provided with a percussion detonator such as the known Italian SRCM35 or the HG USA Mk68). This "percussion/impact" mode is always active by default, so that, if no other mode is selected or if for any reason a timed detonation does not occur, an inertial switch causes the detonation of the HG and hollow shaft/handle with added explosive 22, following an impact. In this case, the HG will always have locked the no longer necessary hand lever in place, by means of pin locks.

b) Detonation activation only by impact against any obstacle: also in this case, the safety which locks the hand lever must remain in place, always keeping it in a safe and locked position (by default).

c) Radio pulse activation, which triggers the immediate detonation of the micro charge for an "Overhead Burst" effect wherever the cable shaft/handle assembly with explosive 22 + any type of HG is located, in its air travel. For this mode a receiving antenna is provided on the electronic circuit 70, schematically indicated with the number 72 in figure 25, adapted to receive a pulse from a remote control, as better specified below. The HG hand lever must always be locked in place by means of a pin lock as described above in paragraphs a) and b).

d) Activation by pressure exerted by the water on the pressure switch 90 with electronic control circuit calibrated at different depths (e.g., and not limited to: 5, 10, 15, 20 m). Instead of the functions described above in points a) - b) and c), when the additional multimodal/multifunctional detonation module is used - without HG 10 - in union with the single hollow shaft/handle 20 with explosive material 22 and ogive 24 as inexpensive and very effective "small auxiliary depth charge" to prohibit the entry of hostile divers into the waters of ports, arsenals, etc., which can be launched from the ground/port mouths/boats, etc.

[0084] Upstream of the electronic circuit 70 there is a battery pack 80 adapted to supply the aforementioned electronic circuit 70 through conductors 81 and to trigger the detonation.

[0085] The module is completed by a safety pressure switch 90 which activates the electronic circuit 70, changing state only after the jet of compressed air coming from the tank 36, or by simple pressure of the spike placed centrally on the four-lobed plate, has ejected the HG 10 - hollow shaft 20 - module 50 assembly, with a programmable safety delay of about 3"-5" or as requested when

ordering the multimodal/multifunction detonator.

[0086] The additional multimodal/multifunctional detonation module 50 thus substantially comprises three well identified and distinct blocks (explosive/control/power) interconnected to each other with a multimodal and multifunctional capability, adapting to different situations and operational needs on land and at sea:

- an explosive block 2 comprising the hollow charge 60 with detonator 62;
- an electronic control block 3;
- a power block 4 comprising the battery pack 80 and the pressure switch 90 activated by the jet of compressed air or by the spike.

[0087] The non-limiting dimensions of the multimodal/multifunction module 50 are: length 75 mm, diameter 33 mm, corresponding to the diameter of the hollow shaft/handle 20. The body of said module 50 is made of high-strength, knurled plastic material for easier grip.

[0088] The module 50, on the side opposite the shank 51, is closed by a screw plug 54 with a central hole 55 on a 6 mm recessed hexagonal key, for the passage of HP compressed air/gases so as to be able to activate the pressure switch 90 placed inside in a front position with respect to the hole.

[0089] The radio pulse activation occurs by means of a transmitting unit which can be a common remote control for home automation and also a cellular terminal operating on prefixed frequencies and on the frequency of the cellular terminals currently on the market, 900, 1800, 1900, 2100 MHz. It can also be programmed with NTF technology or other possible future technologies.

[0090] Such a transmitting unit has been depicted at an extremely schematic indicative level in figure 24 and is indicated with the reference number 500.

[0091] It comprises an on-off microswitch slide 501, slightly recessed in the casing wall so that it can only be operated intentionally, by means of a pointed object. This is done for obvious safety reasons, to avoid unintentional operation of the remote control especially when the operator is in the field.

[0092] A standby button switch 502 is also provided, which can only be activated when the main switch 501 is in the ON state, which serves to activate the transmitter 500; a condition which can be indicated, for example, by the switching on of a red micro-LED 503.

[0093] A further button 504 allows to select the radio-pulse function or the timer function, signalled by further green 505 and yellow 506 micro-LEDs.

[0094] The dual functionality is operated by a selector microswitch slide 507.

[0095] Of course, what is illustrated with regard to the transmitter unit 500 is purely exemplary, since it may have other functions depending on the operating needs on the ground or at sea because the additional multifunction multimodal detonation module has been designed for dual use on land/sea, recalling that a common prop-

erly programmed cellular terminal can also be used for the activation of the different functions.

[0096] The operation of the launching device, whatever the variant, improved according to the invention, occurs indicatively but not limitedly as follows in the launching devices of variant 1, sub-variant 1 and variant 2: by operating the trigger 45, after having previously removed the front cover 35, the discharge of the compressed air contained in the tank 36 is caused, which expels the assembly consisting of the HG 10, the hollow shaft/handle 20 and the additional multimodal/multifunction detonation module 50. With a delay of 3" or 5", the pressure switch 90 changes state and activates the electronic circuit 70, which, depending on the mode in which it was set, i.e., for example by receiving a radio pulse from the transmitting unit in Fig. 500 while the HG is in flight, or at the expiry of the set timing, powers the micro-resistor 61 which increases in temperature, until incandescence, triggering the micro-detonator 62 which detonates the hollow charge 60 and, in chain, the explosive charges 22 in the hollow shaft 20 and the HG 10 (or any other type of HG).

[0097] If the pneumatic + mechanical launching device variant 3 is to be used, the pushing plate 46, see figures 18, 19 and 20, is provided with a steel "spike" which penetrates the threaded plug 54 to compress the pressure switch, closing a circuit and activating, in the chosen mode, the multimodal/multifunction detonator 50 screwed in the tail position of each type of hollow shaft/handle 20 and/or together with the additional explosive 22 with or without HG.

[0098] By way of non-limiting example, some applications will be illustrated below which see the use of the multimodal detonator 50 with launching devices sub-variant and variant 3, pointing out, however, that all the launching devices previously illustrated may be able to perform the following.

AMMUNITION SUITABLE FOR LAUNCHERS VARIANT 1, SUB VARIANT 1, VARIANT 2 AND VARIANT 3

[0099] All the launcher devices mentioned here are able to launch at a considerable distance, on average double or triple and above of the traditional manual launch, any type and model of HG or fuses currently in use in the world FFAA, placed on the hollow shaft/handle 20 through customized and standardized retaining elements, but also standardized elements of different length and containment capacity of explosive material, e.g.: hollow shafts/handles 254mm/10", 190.5mm/7.5" and 127mm/5" but not limited to these standardized measures, which can be modulated in a stable and rational manner through joints and/or other standardized joint elements, as illustrated in figures 27, 28, 29 and 30 where the accompanying figures clearly highlight the launch possibilities also, as a valid alternative to other explosive elements of low cost and high safety and efficiency, in addition to the traditional HG or Fuses currently in use

and in particular:

- figure 27 in the box, shows -A- in axonometric side view and -B- a median longitudinal section and -C- in median longitudinal axonometric section, a launcher device sub-variant 1 carrying therein a hollow shaft/handle 20 with explosive 22 with, fixed to the end occupying the enlarged head 34, a plurality of spherical HGs in this case 4 in number and, at the opposite end, the multimodal/multifunction detonator 50 and, the axonometric view -D-, by way of non-limiting example, of two assemblies where, on a hollow shaft/handle 20, at one end there are 4 Spheroidal HGs (410) and, at the opposite end, the multimodal/multifunction detonator 50 and, below, 3 HGs always of spheroidal type (310), but which could be of any type or geometric shape, with at one end the multimodal/multifunction detonator 50; 5
- figure 28 in the box shows, in axonometric view, a launcher device variant 3 pneumatic + mechanical with, -E- in transparency, a group of 4 HG shown closed in the watertight container with enlarged head 34 and threaded cover 35 tightened for a 5bar watertight seal, likewise -F- the same launcher device variant 3, pneumatic + mechanical but without the cover of the enlarged head 34 and cover 35 is shown. The block in the seat of the HG group is given by a threaded collar which houses an additional lock safety 15, to prevent accidental slippage of the hollow shaft/handle 20 + HG assembly; 10 15 20 25 30
- figure 29 shows, in the panel, a launcher device sub-variant 1 of which an axonometric section is proposed -A- with a median longitudinal depiction of an assembly of several hollow shafts/hollow handles of which the longest 20 has, at the end closest to the container of the HP cartridges/cylinders, a multimodal/multifunctional detonator 50; -B- the same launcher sub-variant 1 with an axonometric view in transparency of the enlarged head 34 and a threaded cover 35; -C- a front view showing 5 127mm/5" shafts with explosive cartridges 22 inserted, assembled with an expected modularity on the hollow shaft/main handle 20 with, in tail position the multimodal/multifunctional detonator 50 and, -D- a side view in a median longitudinal section of the launcher device sub-variant 1, with a plurality of standardized hollow shafts/handles inserted, in two sizes: 254mm/10" hollow shaft/handle 20, and the smallest 127mm/5" hollow shaft/handle linked to each other through appropriate standardized joining elements (not highlighted here) to constitute a low-cost but high-efficiency and high-potential ammunition, and as an alternative to the common HGs whichever they may be; 35 40 45 50
- figure 30 shows in a box an ammunition for all the launching devices shown here, obtained by simple combination of modular elements adapted to launch 55

with the above launching devices and with the possibility of being additivated, in the appropriate inner space, with explosive and/or incendiary charges, as indicated in figure 22. More specifically, in the box of figure 30, an assembly of standardized elements can be seen of which: -E- a hollow shaft/hollow handle 20, 254mm/10" long with explosive 22 and, in a tail position the multimodal/multifunction detonator 50; on the aforementioned hollow shaft/handle element 20, an additional hollow shaft/hollow handle is inserted through standardized joints along the half of the previous hollow shaft/handle 20, therefore 127mm/5" and, with an additional pair of standardized joining elements, another 4 127mm/5" hollow shafts, all with explosive material inserted which can be of various types. The total explosive material included in this assembly is more than 400 gr, therefore equal to 2 or 3 times that contained by a common HG whatever the type or shape; -F- the already well analyzed and several times displayed in this document hollow shaft/handle 20, in which the additional explosive 22 is identified and with the multimodal/multifunction detonator module 50 in the tail position. In the head the ogive 24 for a better aerodynamic and/or hydrodynamic behaviour when for sea use; it is also shown, -G-, a 1:1 functional sample of the hollow shaft/hollow handle 20 made of highly resilient injected plastic material (polycarbonate/PC) for practical functional tests (real tests); figure 30, also shows in a box a suitable ammunition for all the launching devices shown here, obtained by simple combination of modular elements (hollow shafts/hollow handles) adapted for launching with the above launching devices and with the possibility of being additivated, in the appropriate inner space, with explosive and/or incendiary charges 22.

[0100] Therefore, it is apparent that all the HP air/gas launcher devices, variant 1, sub-variant 1, variant 2 and the pneumatic + mechanical launcher variant 3, can use, without any limitation, the multimodal/multifunction detonator device 50.

[0101] From the above, the advantages of the launching device of hand grenades of any model and type, according to the invention, are evident. In particular, the launcher device of HG being, in its various versions variant 1, sub-variant 1, variant 2 and variant 3, adapted to the remote launch of the most various explosive and non-explosive objects (for example: for police/public order purposes and for recreational purposes such as Soft Air-Gaming) in a silent manner, as it is not of the pyric type (launch of explosive objects, whatever they may be, through traditional launcher operating with a pyric cartridge), but of a totally pneumatic or mixed pneumatic + mechanical drive type, it is also extremely silent when compared with, and on the contrary, the Bomb launchers with a pyric charge and explosive at the time of launch which inevitably reveals the launch area, putting the op-

erators at risk of detection.

[0102] Furthermore, the range of the launching devices and its specific but not limiting ammunition, presents great operational flexibility, as it is adapted to launch indifferently and without any external/physical alteration of any type of HG worldwide, and of any explosive object, also modular, since the barrel 30 can - optionally - also be elongated with additional modular units, for example of greater and/or shorter length, with female thread on the male thread side 32 and male thread on the enlarged head 34 to which it connects by screwing, as shown below: HG of every type and geometric shape, fuses of every model and type, pyric and electronic/piezoelectric, single hollow shafts/handles of every length - as previously specified - also in combination with each other in the various lengths with, inside an explosive charge of various nature, and activated by "natural" opening of the hand lever of the HG placed on top of said hollow shaft/handle, held by a special retaining cage, as shown in figure 4 and exiting from the enlarged head 34. Detonation of the foregoing, hollow shafts/handles and HGs of all types and geometric shapes, with activation in time, by impact, or by radio control, through the multimodal/multifunction detonator 50.

[0103] Further embodiments of the invention are in a first further embodiment a launching device, arranged in 3 variants plus a sub-variant, of hand grenades (10) whatever the type, fuses for hand grenades (17) whatever the type, or of a plurality of hand grenades (310) and (410) carried by a gripping and retaining member (11) mounted on a substantially cylindrical hollow shaft (20) or even only the substantially cylindrical hollow shaft/hollow handle (20) with an aerodynamic /hydrodynamic head (24), characterized in that they can be inserted into a tubular body (30) having at one end an enlarged head (34), adapted to house, respectively, said cylindrical shaft (20) and said gripping member (11) with the hand grenade (10) or the fuse (17), or a plurality (310) and (410) of hand grenades of various order and type or only the hollow shaft (20) with aerodynamic/hydrodynamic ogive (24), and a threaded cover (35) adapted to 5bar watertight close said enlarged head (34); at the other end of said tubular body/barrel (30) a high pressure compressed air/gas tank (36) or a container with a plurality of compressed gas cartridges /cylinders (37), or an elastic element of various shapes: coil spring (47), or a pair of coil springs arranged coaxially, or a volute spring, or rubber elastic elements and, in combination with pushing, also as a booster, another source of compressed air/gas consisting of a commercial or special high-pressure compressed gas cartridge/cylinder inserted in the handle/grip (41) whose discharge is controlled by the same handle/grip (41) with a trigger (45) made integral with said tubular body/barrel (30).

[0104] A launching device as defined above, in which said handle/grip (41) having a cavity (44) housing a compressed gas cartridge/cylinder activatable by said trigger (45) to actuate, through a connection conduit (43) be-

tween said handle/grip (41) and said tank (36) or container of a plurality of cartridges/cylinders (37), a pneumatic valve which causes rapid discharge of the compressed air contained in said tank (36) or container with a plurality of compressed gas cartridges/cylinders (37), or an elastic element (47) with a four-lobed plate and spike 46, referred to the above launching device.

[0105] A launching device as in the first embodiment described, characterized in that said handle (41) has a cavity (44) housing a battery pack connected, by means of an electrical conductor through a connection conduit (43) between said handle/grip (41) and said tank (36), or container for a plurality of high pressure cartridges/cylinders (37), to a solenoid valve which controls the discharge of compressed air from the tank (36) or container for a plurality of High Pressure Cartridges/Cylinders (37) when said trigger (45) is actuated, acting on a switch which closes the circuit between said battery pack and said solenoid valve.

[0106] A launching device as described in one of the further embodiments described above, in which a second handle/grip (40) made integral with said tubular body/barrel (30) is provided.

[0107] A launching device as described in one of the further embodiments described above, in which said handles/grips (40 and/or 41) are made integral with said tubular body/barrel (30) by means of interference engagement of protrusions(42) provided thereabove with longitudinal undercut grooves provided on said tubular body/barrel (30).

[0108] A launching device as described in one of the further embodiments described above, in which said enlarged head (34) and said compressed air/gas container (36) or container for a plurality of compressed air/gas cartridges/cylinders (37), are fixed to the respective ends of said tubular body (30) by threading (33), as well as by threading said threaded cover (35) is fixed to the enlarged head (34), which is screwed on the thread (32).

[0109] A launching device as described in one of the further embodiments described above, in which said cylindrical shaft/handle (20) carrying the gripping and retaining member (11) of the hand grenade (10), or the fuse (17) or only the hollow shaft/handle (20), or a plurality of hand grenades (310) and (410), has on its side surface at least one O ring (25) adapted to pneumatically seal against the inner wall of said tubular body/barrel (30).

[0110] A launching device as described in one of the further embodiments described above, in which said cylindrical shaft/handle (20) is internally hollow and houses at least one additional explosive charge (22) preferably in the form of cartridges.

[0111] A launching device as described in one of the further embodiments described above, with a plurality of tubular bodies/barrels (100) comprising a plurality of launching devices (1) arranged around a compressed air cylinder (101) which supplies through conduits (102) the tanks (36) of the respective devices (101), all being supported by a pair of handles/grips (40) and (41), the latter

with trigger (45) for controlling the discharge of the compressed air/gas cylinder (101).

[0112] A launching device as described for the previous embodiment, in which a selector is provided for the selective discharge for each tubular body/barrel (30) of said compressed air cylinder (101), towards the individual devices/barrels (30).

[0113] A launching device as described in one of the further embodiments described above with, at the opposite end of the enlarged head (34), an elastic element in the form of a simple coil spring (47), or an elastic element formed by a pair of coaxially arranged springs, or a volute spring, or rubber elastic elements, with at the end of said elastic element towards the enlarged head (34) a four-lobed pushing plate (46) with a steel spike projecting therefrom, to activate another multimodal/multifunction detonator device (50) inserted, by screwing, on the threaded shank (23) of the hollow shaft/handle (20).

[0114] A launching device as described in one of the further embodiments described above in which said cylindrical shaft (20) with, optionally additional explosive (22) inside and carrying the gripping and retaining member (11) of the hand grenade (10), or of the fuse (17), or a plurality of hand grenades (310) and (410) or only the hollow shaft/handle (20) with an ogive (24) has, on its side surface, at least one O ring (25) adapted to seal against the inner wall of said tubular body (30) with, fixed to its free opposite end by means of a thread (23), a multimodal/multifunction detonator device (50) to the thread (51), activated by means of a compressed air blow or by means of a four-lobed pusher with spike (46).

[0115] A multimodal/multifunction detonator device connected, by means of a thread (51), indispensable for an independent detonation of the standard detonator mounted on the hand grenade operated by the usual hand lever, of the hollow shaft/handle (20) with additional explosive inserted inside (22) and the hand grenade (10), or a plurality of hand grenades (310) and (410) whatever the model and type: 2-3-4, etc. in number, fixed on the hollow shaft/handle (20) with explosive inside (22) or of only the hollow shaft/handle (20) with an aerodynamic/hydrodynamic ogive (24) at the opposite end, with additional explosive inserted inside (22); the detonation, always operated by the launcher device both for compressed air/gas blowing and for an elastic element (47) with a pushing plate and steel spike (46), occurs in different modes as a function of the operating needs in the field:

- a) with variable timing, but not limited to, 5-10 seconds;
- b) by impact/percussion on solid/semi-solid obstacle;
- c) by radio signal with appropriate radio wave-emitting device, as non-limiting example, a device for home automation or also, alternatively, an appropriately programmed cellular terminal, in order to obtain an aerial detonation;

- d) by means of water pressure exerted on the pressure switch (90), programmable, for example: 5, 10, 15, 20 m, but not limited to these depths: therefore behaving as a very effective small auxiliary type depth bomb, operating at different depths depending on those currently found in the Ports and/or Arsenals in anti-intrusion defence of these military and non-military installations.

[0116] A launching device as described in one of the further embodiments described above with, inside the tubular body/barrel (30), the hollow shaft/handle (20) with - optionally - the additional explosive inserted therein (22), carrying on a gripping member (11) a hand grenade (10), or a plurality of hand grenades (310) and (410) whatever the model and type: 2-3-4, etc. in number, operated by a single hand lever or by several hand levers (14) in case of a plurality of hand grenades (310) and (410) 2-3-4, etc. in number, after removal of the safety ring (15) which, as it exits from the enlarged head (34), opens by natural divergence pushed by any elastic element placed under it/them, consequently activating the fuse/fuses, detonating the hand grenade (10) or the plurality of hand grenades (310) and the elapsed time prefixed in the factory, usually 3.5-4 seconds.

[0117] A launcher device as described in one of the further embodiments described above with, inside the barrel (30), in place of the hand grenade (10), the fuse (17) placed on the gripping member (11) of the hollow shaft/handle (20) or hollow shaft/handle (18) with - integrated/one-piece - the gripping and retaining members (11) with, inside, the optional explosive (22) preferably in cartridges; deprived of the ring safety (15), possibly with, placed on the hand lever (14), spacers (12) and (13) to compensate for the empty space which may be between the inner diameter of the enlarged head (34) and the upper face of the hand lever (14), which must compulsorily and securely touch the inner wall, thus preventing it from opening in an untimely and very dangerous manner, inside the enlarged head (34) no longer constrained by the walls of the same enlarged head (34), causing an unintended and lethal detonation of the assembly.

Claims

1. Launching device of hand grenades (10), fuses (17) for hand grenades, of a plurality of hand grenades (310, 410) carried by a gripping and retaining member (11) mounted on a substantially cylindrical hollow shaft (20) or of only the substantially cylindrical hollow shaft (20) with an aerodynamic/hydrodynamic ogive (24) comprising:

- (a) a tubular body (30) bearing at one end an enlarged head (34), adapted to house, respectively, said cylindrical shaft (20) and said grip-

ping member (11) with the hand grenade, or the fuse, or a plurality of hand grenades (310, 410), or only the hollow shaft (20) with aerodynamic/hydrodynamic ogive (24);

(b) a threaded cover (35) adapted to close said enlarged head (34) in a watertight manner; and fixed to the other end of said tubular body (30)

(c) a tank (36) of high pressure compressed air or gas or a container with a plurality of compressed gas cartridges (37);

(d) a grip (41) with a cavity and a trigger (45) mounted on said grip (41) and made integral with said tubular body (30), comprising in said cavity:

(d-1) a high pressure compressed gas cartridge whose discharge is controllable by means of said trigger (45); or

(d-2) a battery pack connected by means of an electrical conductor passing in a connection conduit (43) arranged between said grip (41) and said tank (36) or said container for the plurality of cartridges (37) to a solenoid valve which controls the discharge of compressed air from the tank (36) or container for the plurality of cartridges (37) by actuating said trigger (45) acting on a switch which closes the circuit between said battery pack and said solenoid valve;

characterized in that it further comprises in the launcher body:

(d) an elastic element, in particular selected from a coil spring (47), a pair of coaxially arranged coil springs, a volute spring, or rubber elastic elements.

2. Launching device according to claim 1, **characterized in that** said elastic element is an elastic element (47) with a pushing plate (46) with a spike, preferably made of steel.

3. Launching device according to claim 2, **characterized in that** said plate is a four-lobed plate.

4. Launching device according to claim 1, **characterized in that** it comprises, at the opposite end of the enlarged head (34), said elastic element in the form of a coil spring (47), or an elastic element formed by a pair of coaxially arranged springs, or a volute spring, or rubber elastic elements, with at the end of said elastic element towards the enlarged head (34) a four-lobed pushing plate (46) with a steel spike exiting therefrom to activate a multifunctional detonator device (50) insertable/inserted, by screwing, on the threaded shank (23) of the hollow shaft (20).

5. Launching device according to any one of the pre-

ceding claims, **characterized in that** said hand grenades are non-lethal, such as smoke, tear gas or stunning flash bang bombs, or those in use for recreational purposes in Soft-Air Gaming.

6. Launching device according to any one of the preceding claims, **characterized in that** said grips (40, 41) are made integral with said tubular body (30) by means of interference engagement of protrusions (42) provided thereabove with longitudinal undercut grooves provided on said tubular body (30).

7. Launching device according to any one of the preceding claims, **characterized in that** said enlarged head (34) and said tank (36) or said container for a plurality of cartridges (37) are fixed to the respective ends of said tubular body (30) by threaded screwing (33), and that said threaded cover (35) is fixed to the enlarged head (34), in turn screwed on the thread (32).

8. Launching device according to any one of the preceding claims, **characterized in that** it comprises an element selected from said cylindrical shaft (20) carrying the gripping and retaining member (11) of the hand grenade (10), the fuse (17), the hollow shaft only, a plurality of hand grenades (310, 410) wherein said shaft preferably has on its side surface at least one O-ring (25) adapted to pneumatically seal against the inner wall of said tubular body (30) and/or that said cylindrical shaft is internally hollow and houses at least one additional explosive charge (22), preferably in the form of cartridges.

9. Launching device according to claim 8, **characterized in that** at the free opposite end of said shaft (20) a multifunction detonator device (50) is fixed by means of thread (23) to the thread (51), which can be activated by compressed air blowing or by means of a four-lobed pushing plate with spike (46).

10. Launching device according to claim 9, **characterized in that** the detonator is controllable with different modes as a function of the operating needs in the field:

- with variable timer;
- by impact on a solid or semi-solid obstacle;
- by means of a radio signal with an appropriate radio wave-emitting device;
- by means of water pressure exerted on a pressure switch (90) programmable at different depths and present in said detonator.

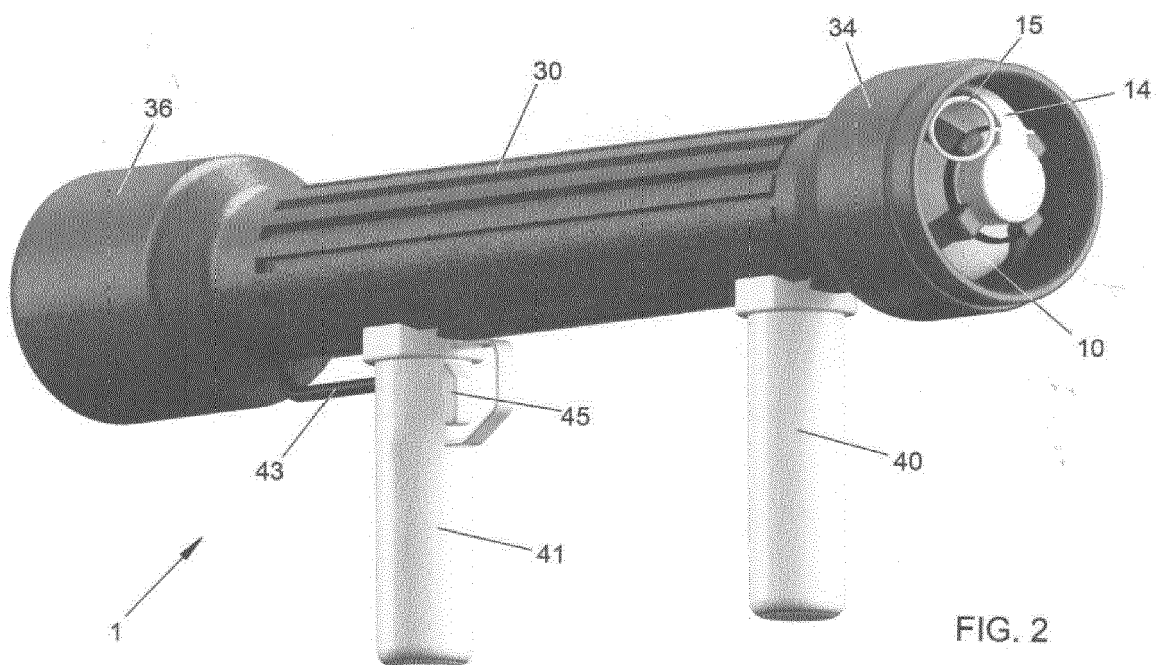
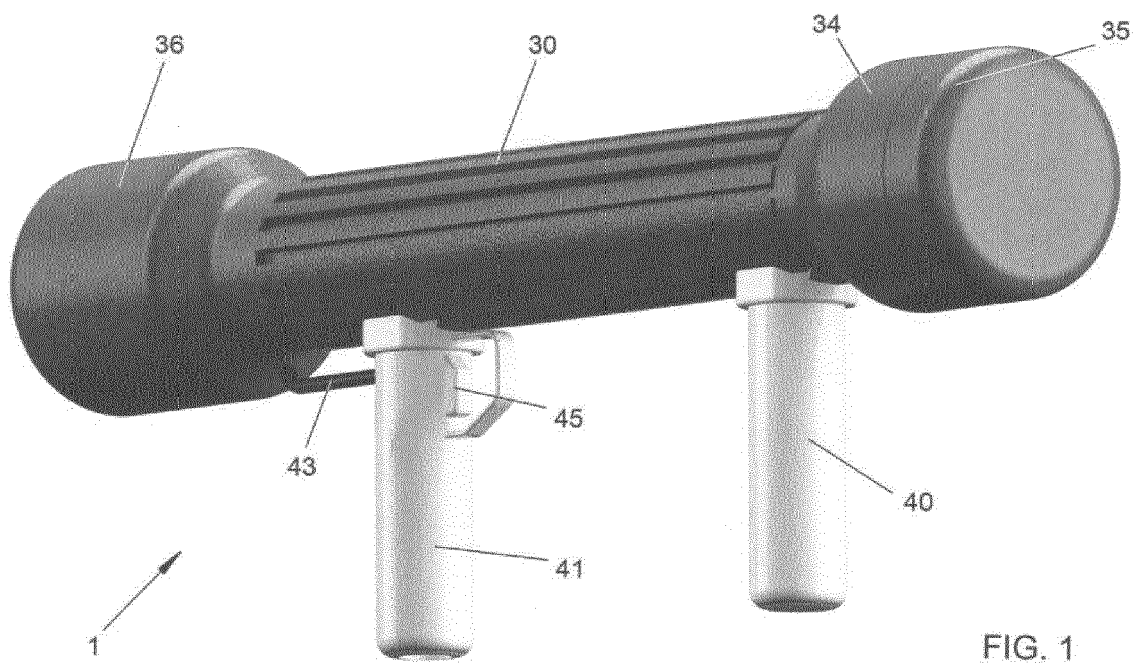
11. Launching device according to any one of the preceding claims, **characterized in that** said hand grenade is operable by a hand lever after removal of a safety ring (15) present on the hand grenade so as

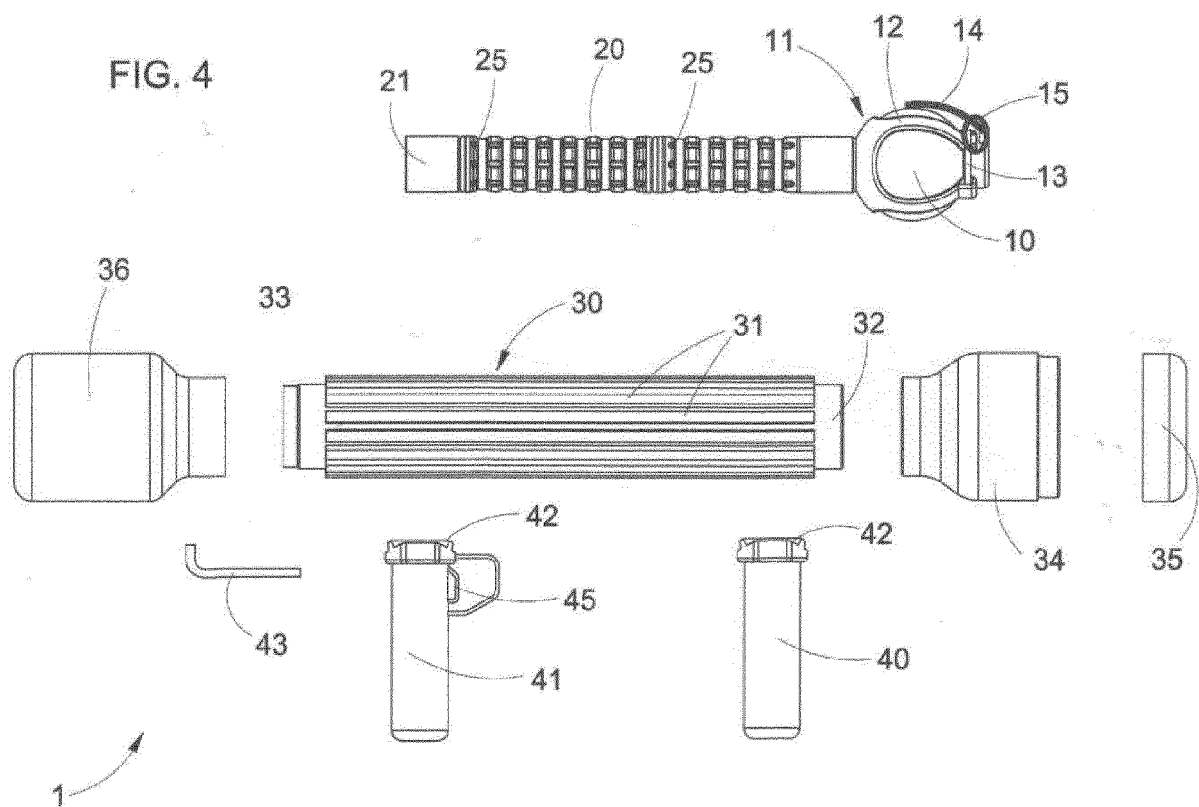
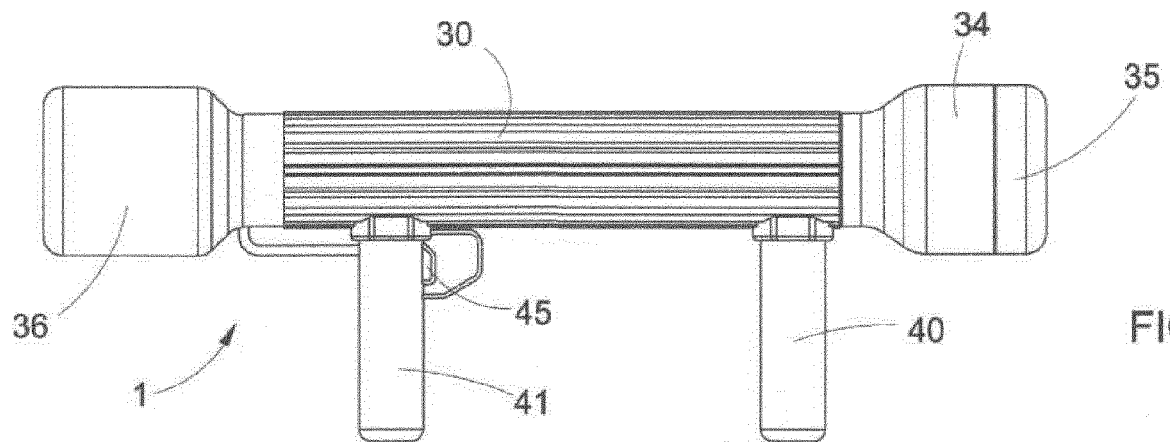
to open at the exit from said enlarged head (34) by natural divergence pushed by an elastic element placed below said lever, consequently actuating a fuse which is activated, detonating the hand grenade after a prefixed time has elapsed.

5

12. Launching device according to one of the preceding claims, **characterized in that** it comprises said hand grenade deprived of the safety ring (15) and placed on the hand lever (14) of the spacers (12, 13) to compensate for an empty space between the inner diameter of the enlarged head (34) and the upper face of the hand lever (14). 10
13. Launching device according to any one of the dependent claims, **characterized in that** in the case of the variant (d-1) the opening of the gas cartridge housed in said grip (41) can be activated by means of said trigger (45) to actuate a pneumatic valve through a connection conduit (43) between said grip (41) and said tank (36) or container of a plurality of cartridges (37), which causes the rapid discharge of the compressed air contained in said tank (36) or container with the plurality of cartridges (37). 15 20 25
14. Launching device according to any one of the preceding claims, **characterized in that** said elastic pushing element is tensioned by a high torque electric motor powered by batteries, wherein said motor is preferably contained in a type of nacelle (38) below said tubular body (30) with a relative gear reducer box (92) which drives a worm screw (94) on which a carriage (93) slides to which a high strength steel cable (49) is connected through a clearance of several pulleys, longitudinally and in a central position crossing said coil spring (47), one end to the four-lobed pushing plate (46) with spike and the other end fixed to any fixing and locking point in the nacelle (38), and wherein the batteries are preferably contained in said grip. 30 35 40
15. Multiple launching device comprising a plurality of said launching devices according to any one of the preceding claims arranged around a compressed air cylinder (101) which feeds through conduits (102) the tanks (36) of the respective launching devices without respective grips, all being supported by a pair of grips (40, 41) of which one (41) with trigger for controlling the discharge of the compressed air/gas cylinder (101) wherein, preferably, a selector for the selective discharge of each individual launching device is provided. 45 50

55





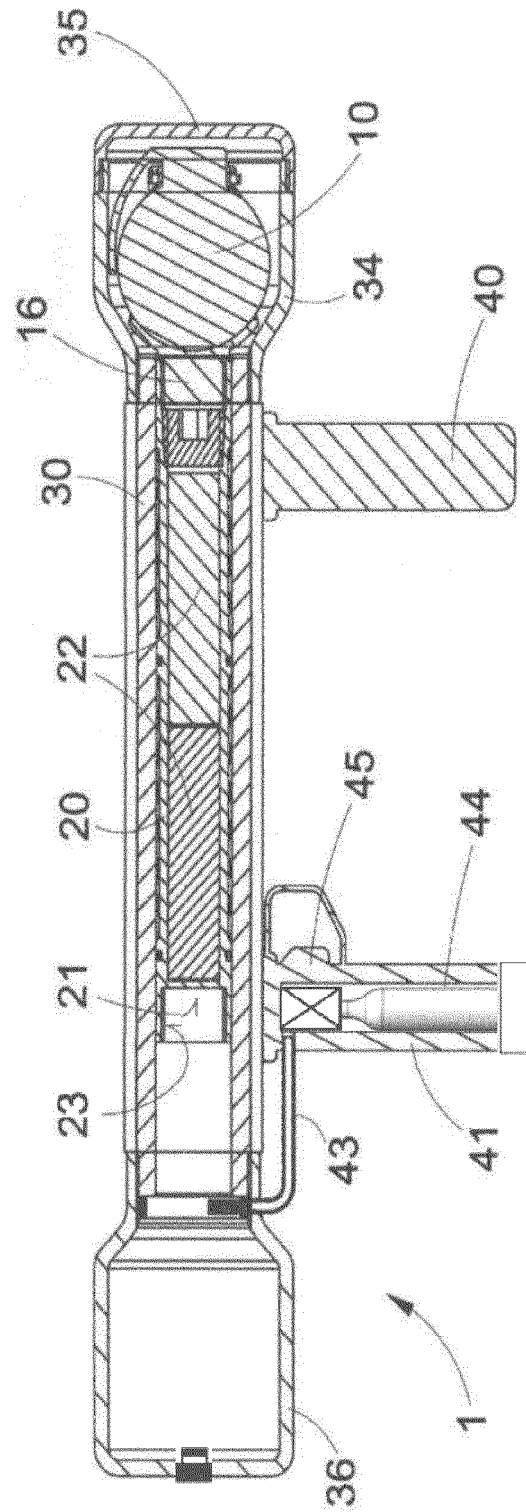


FIG. 5

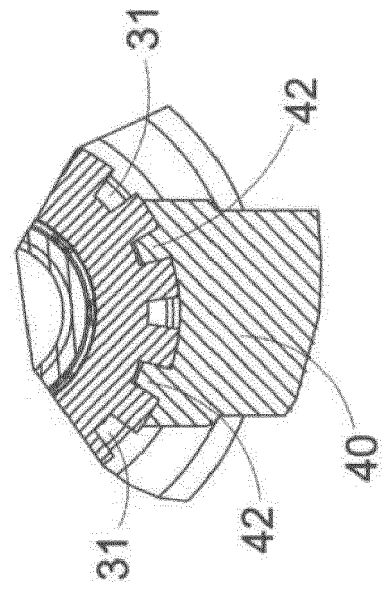
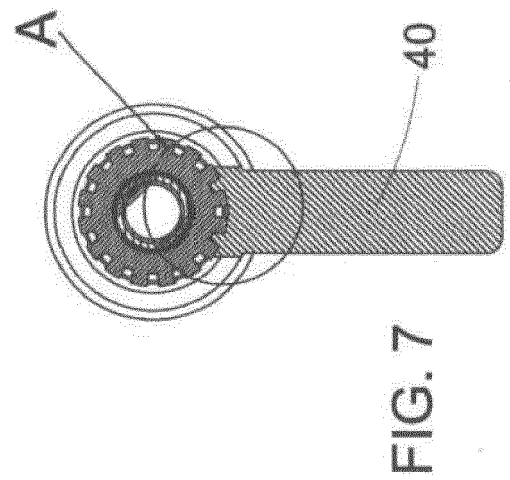
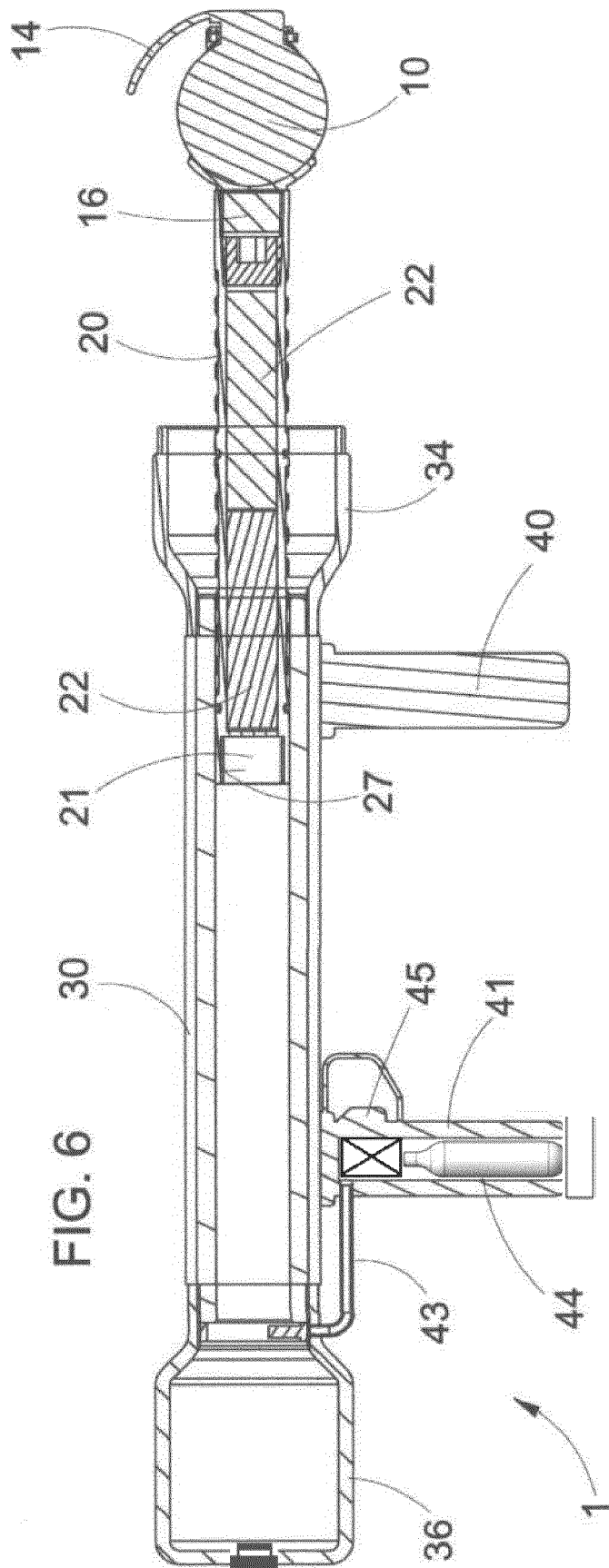


FIG 9

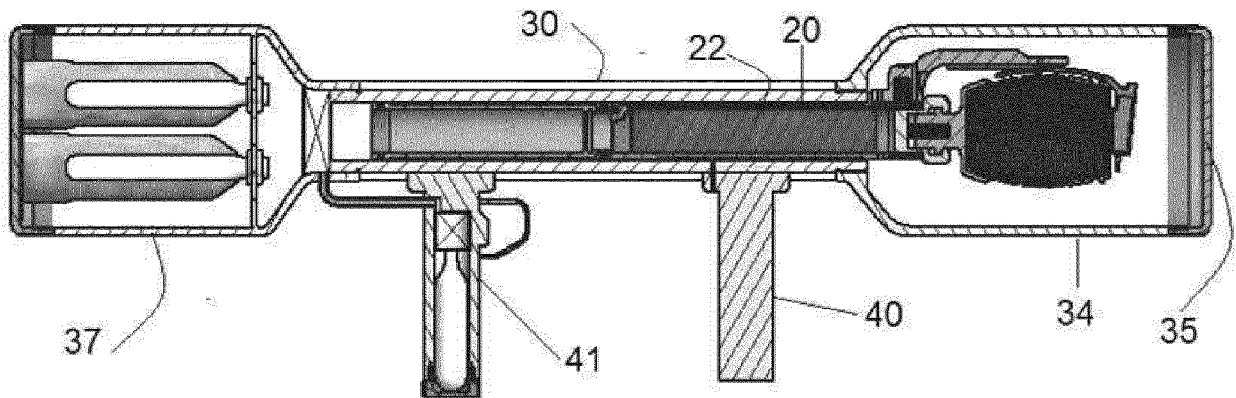


FIG 10

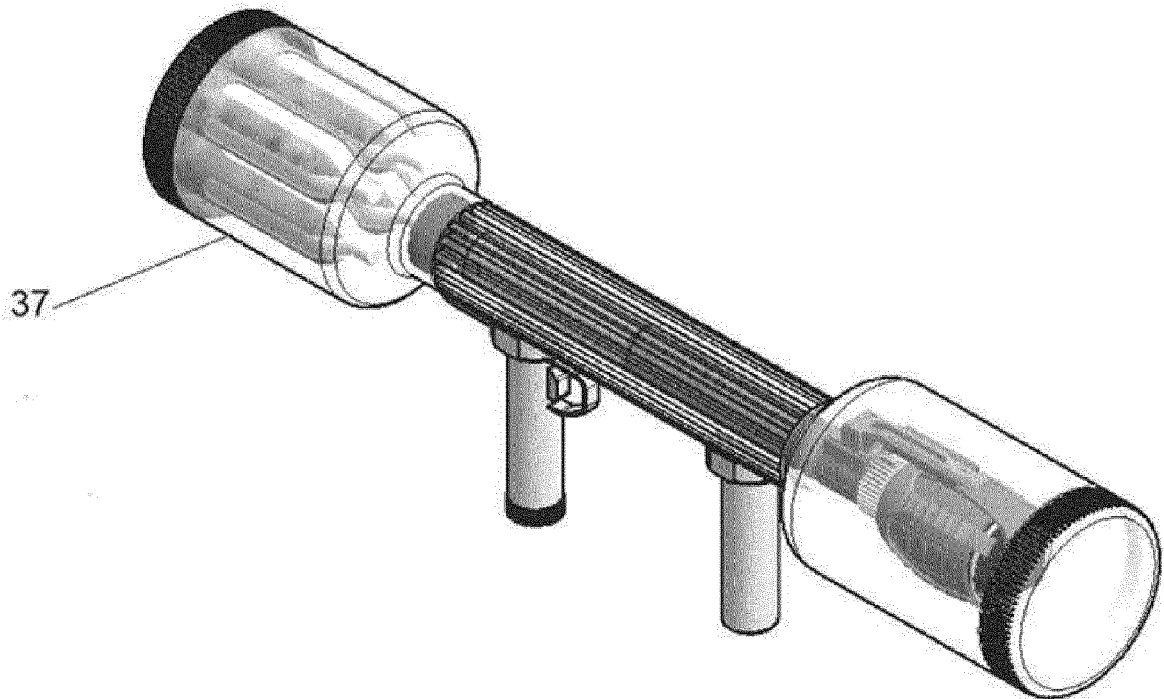


FIG 11

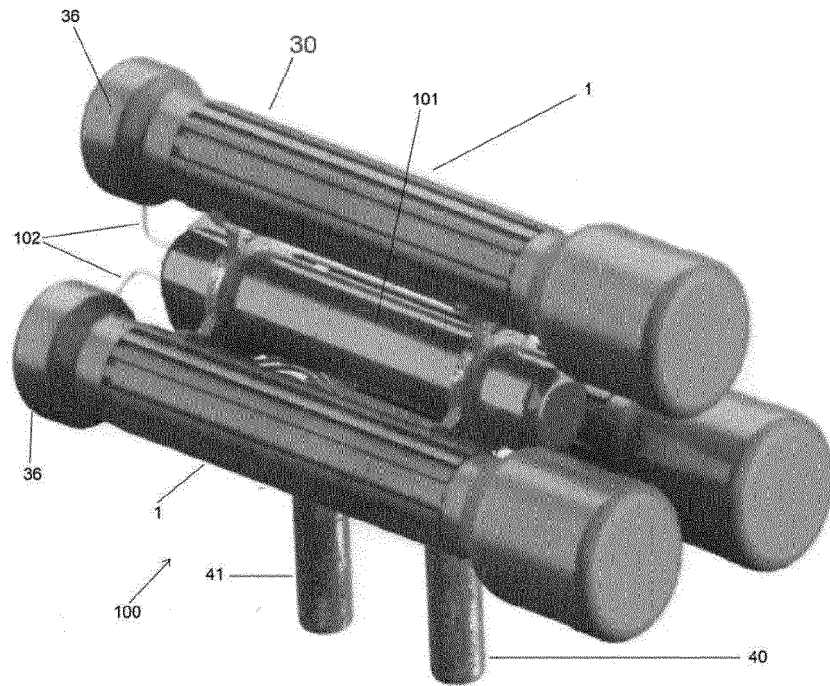


FIG.12

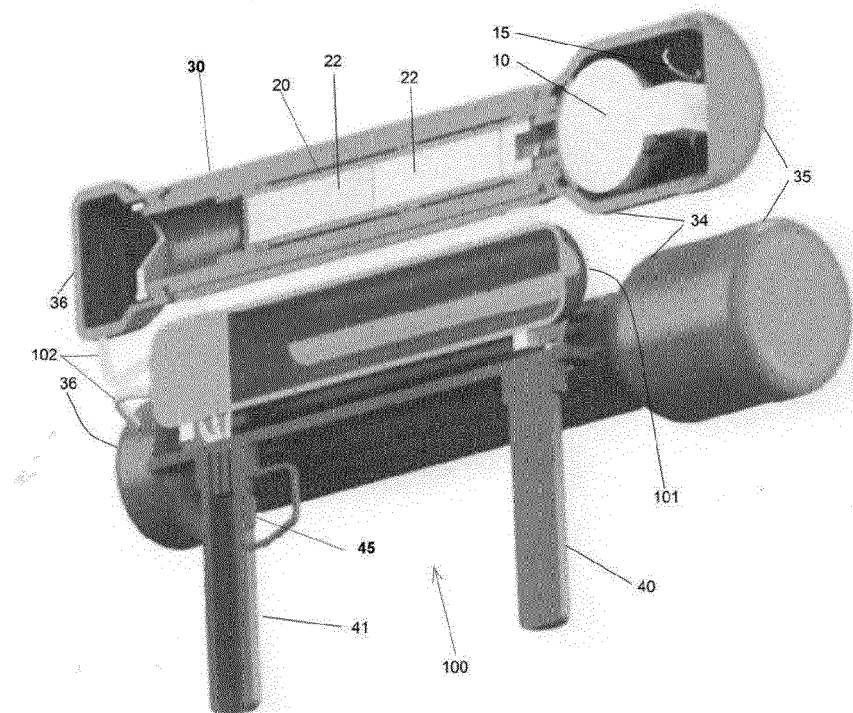


FIG 13

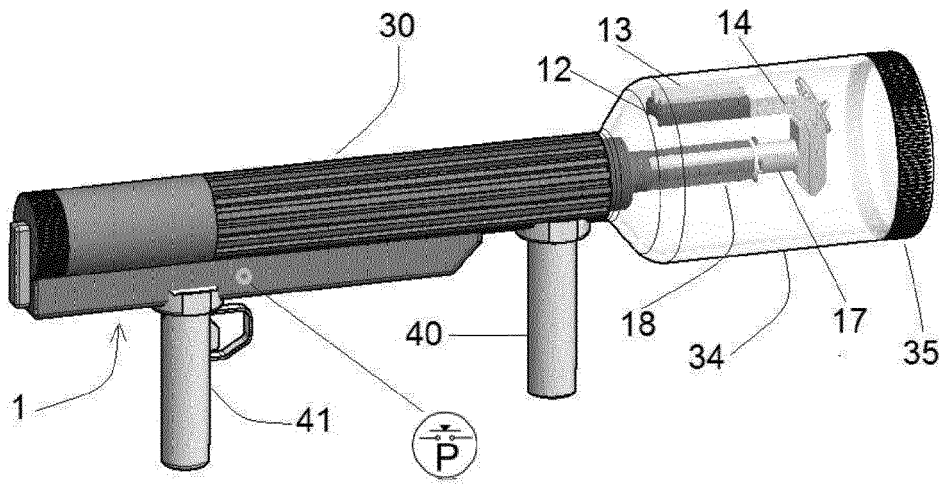


FIG 14

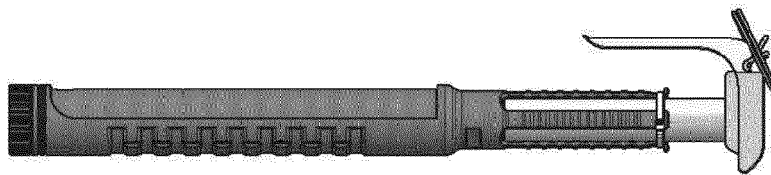


FIG 15

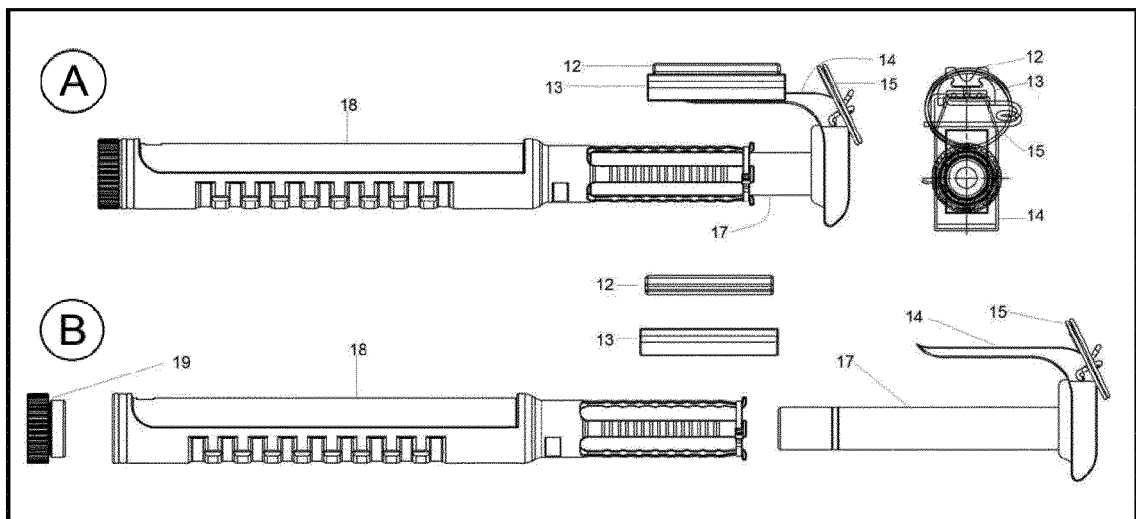


FIG 16

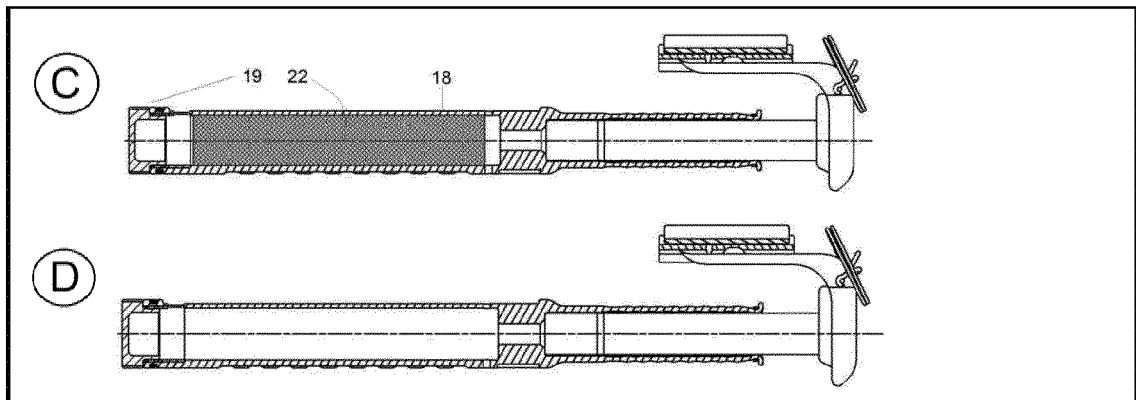


FIG 17

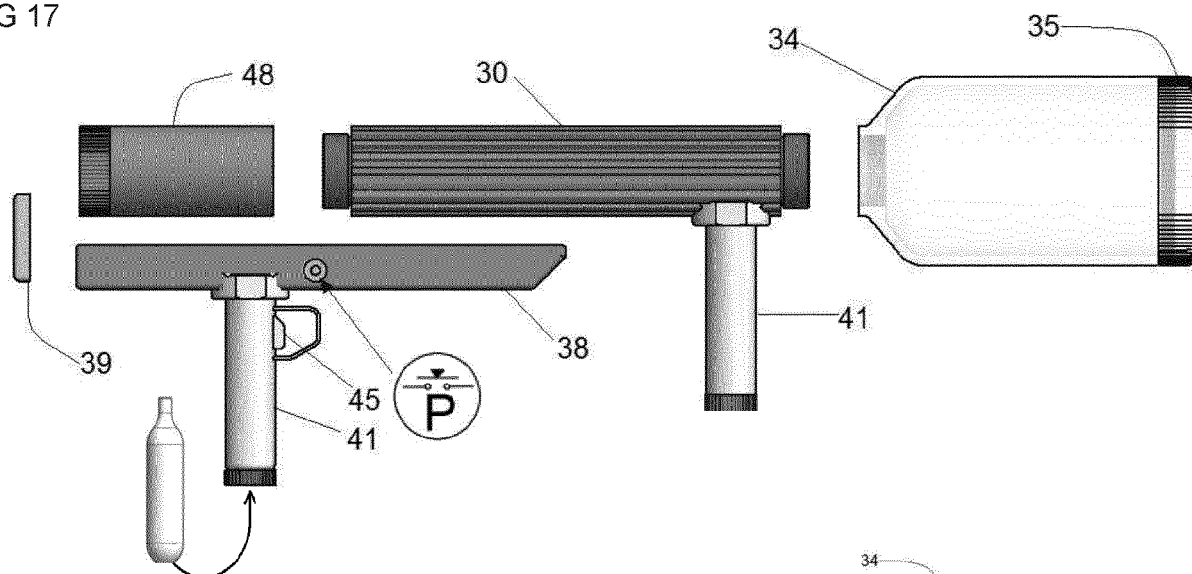


FIG 18

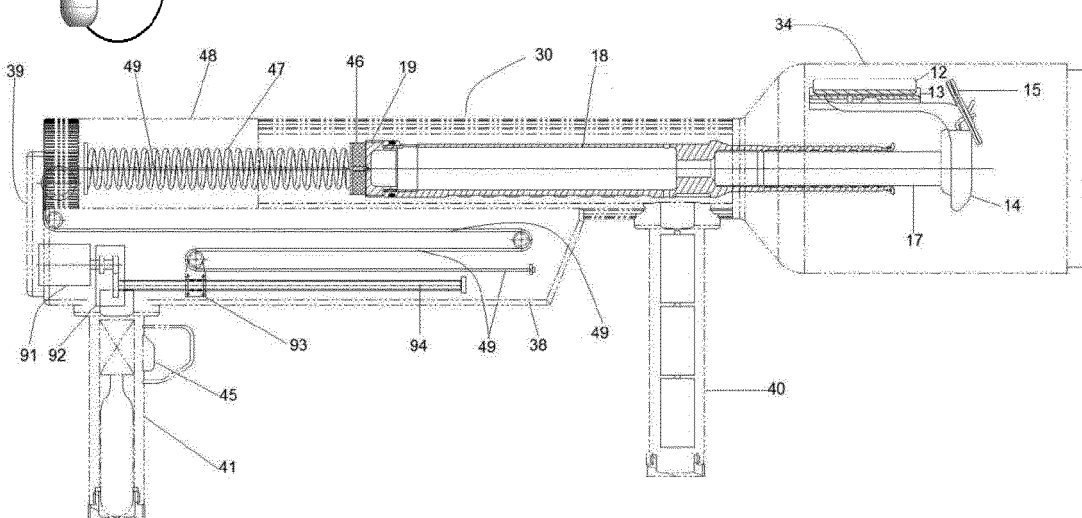


FIG 19

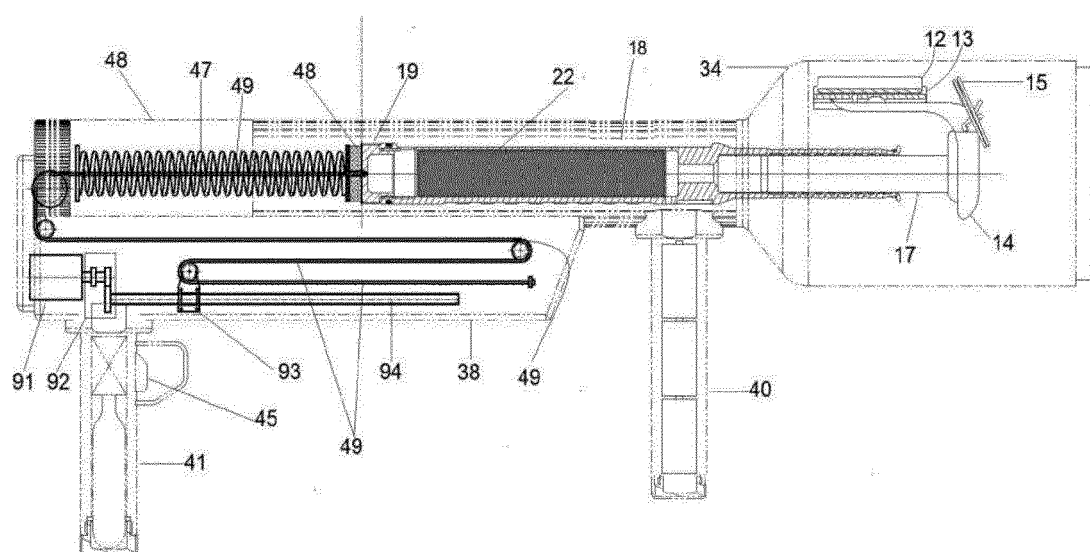
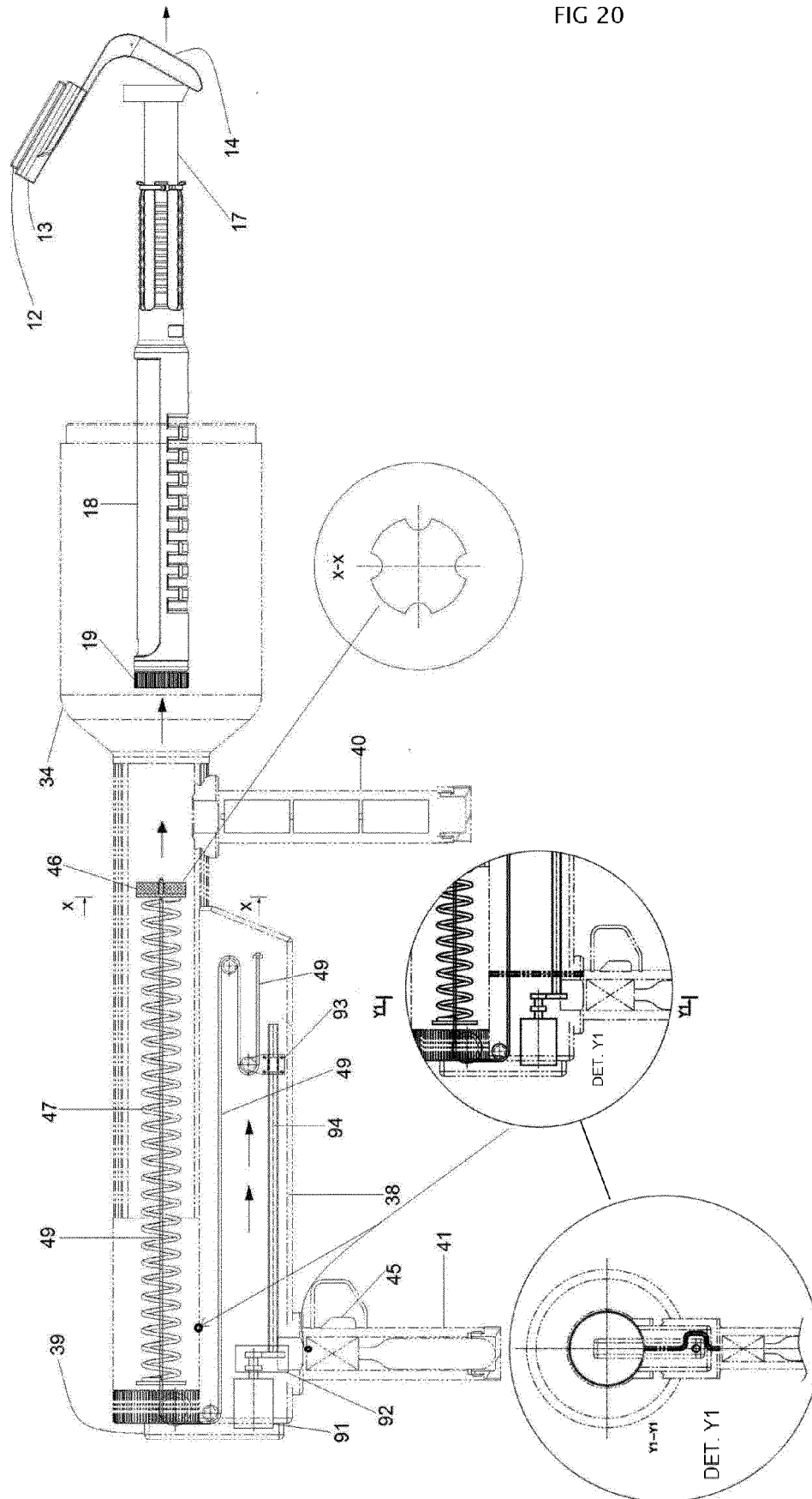
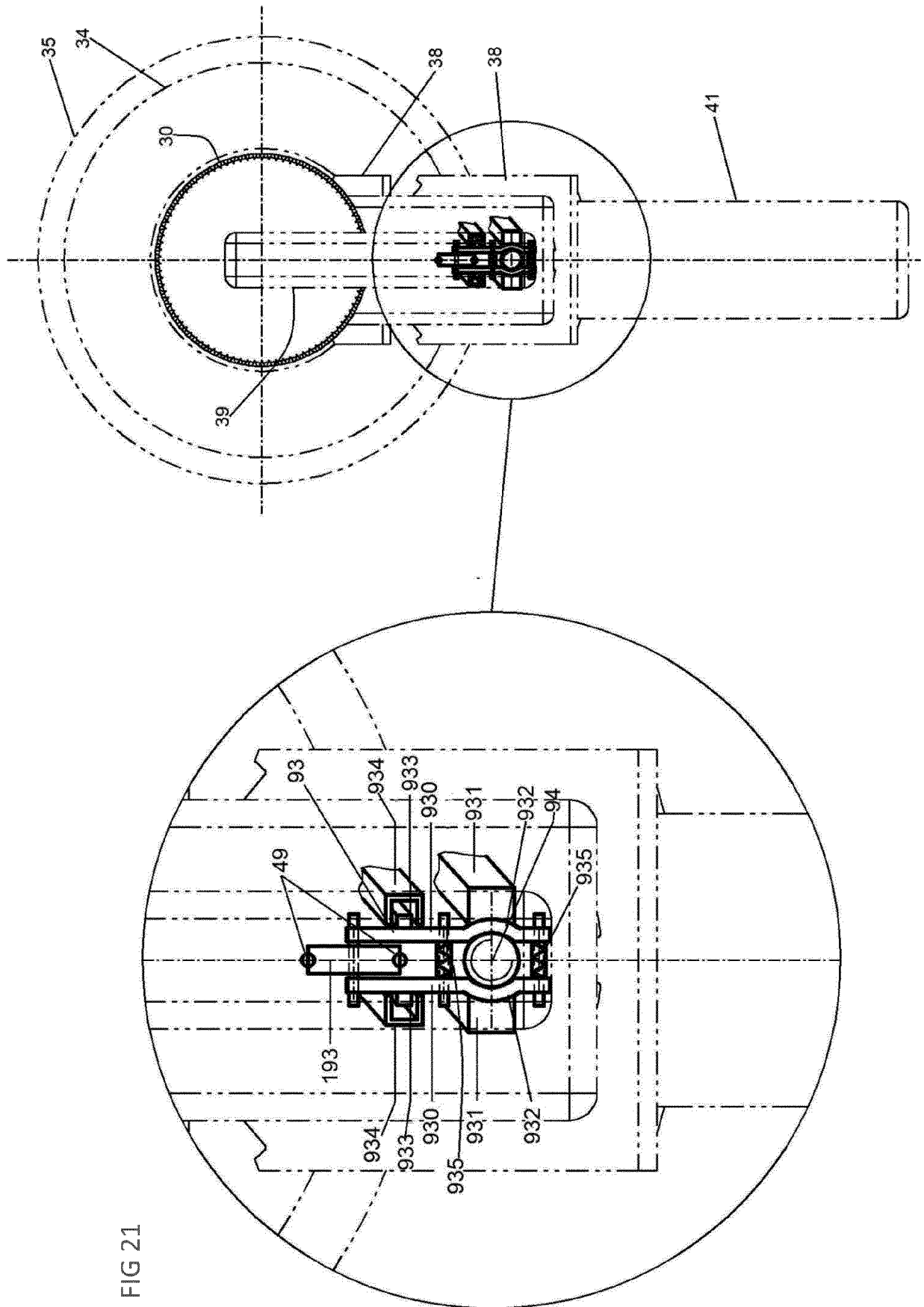


FIG 20





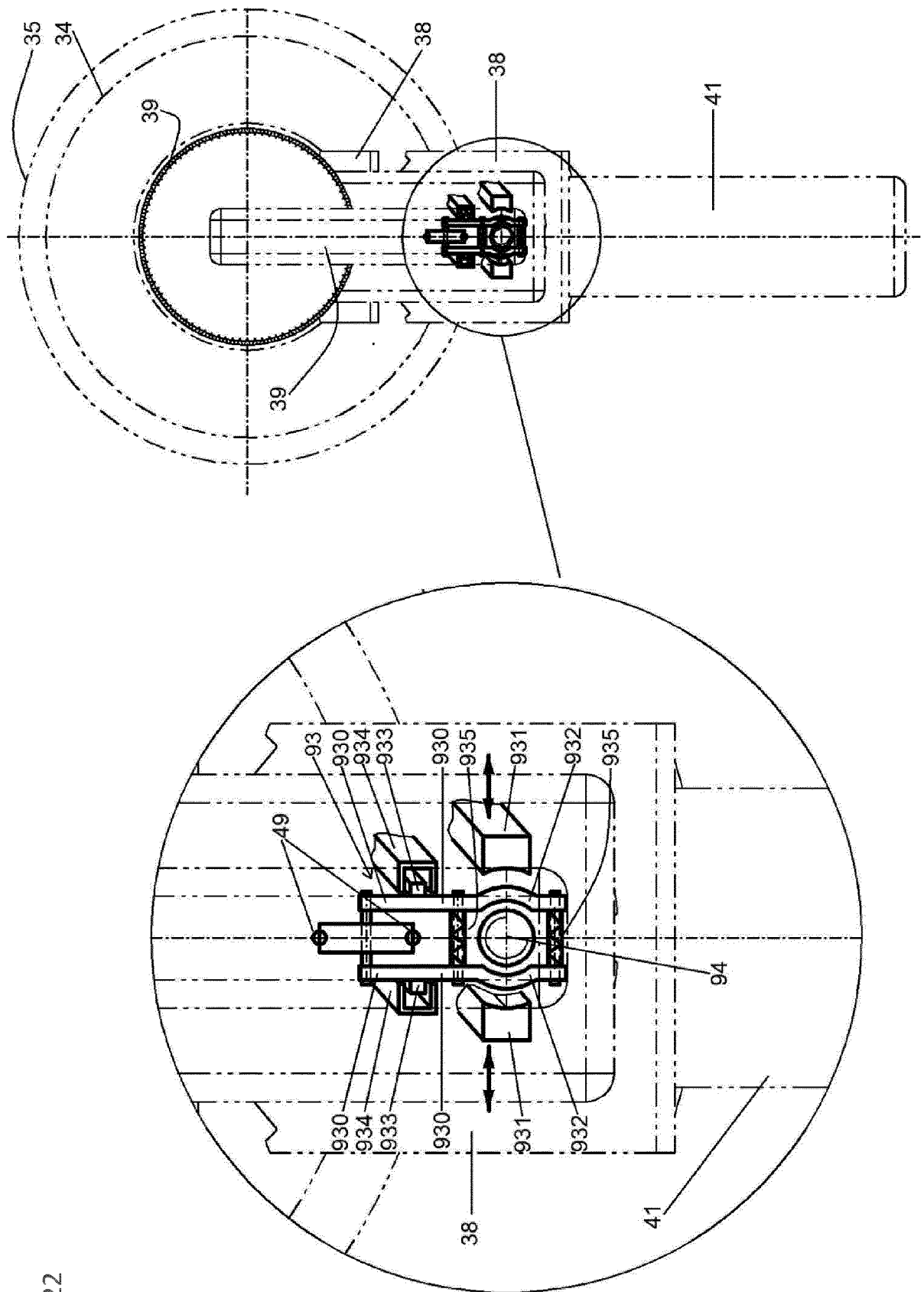


FIG 22

Fig 23

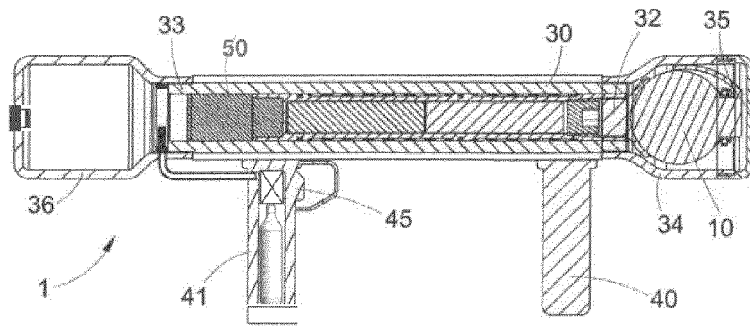


FIG 24

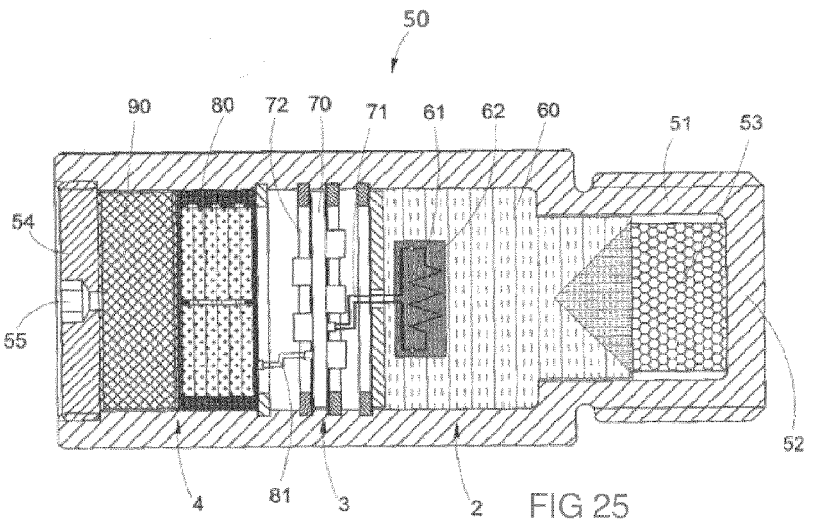
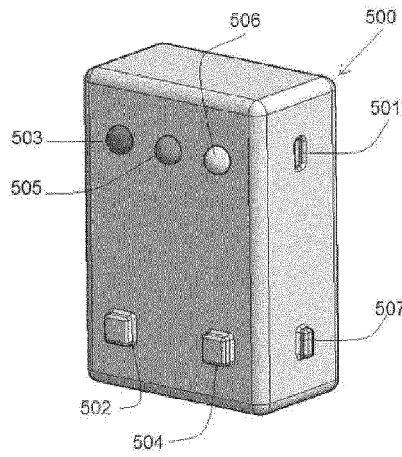


FIG 25

FIG 26

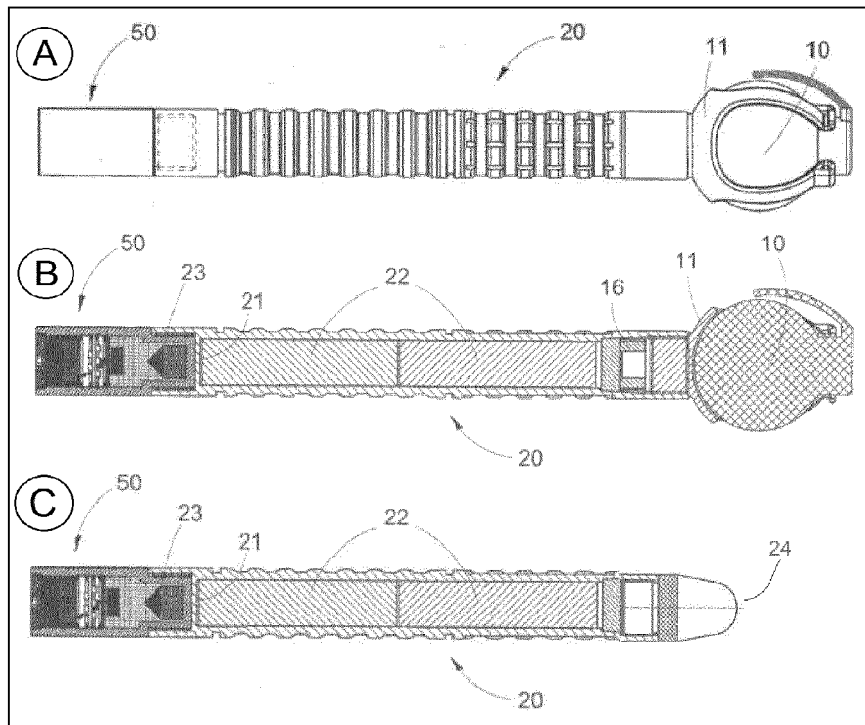


FIG 27

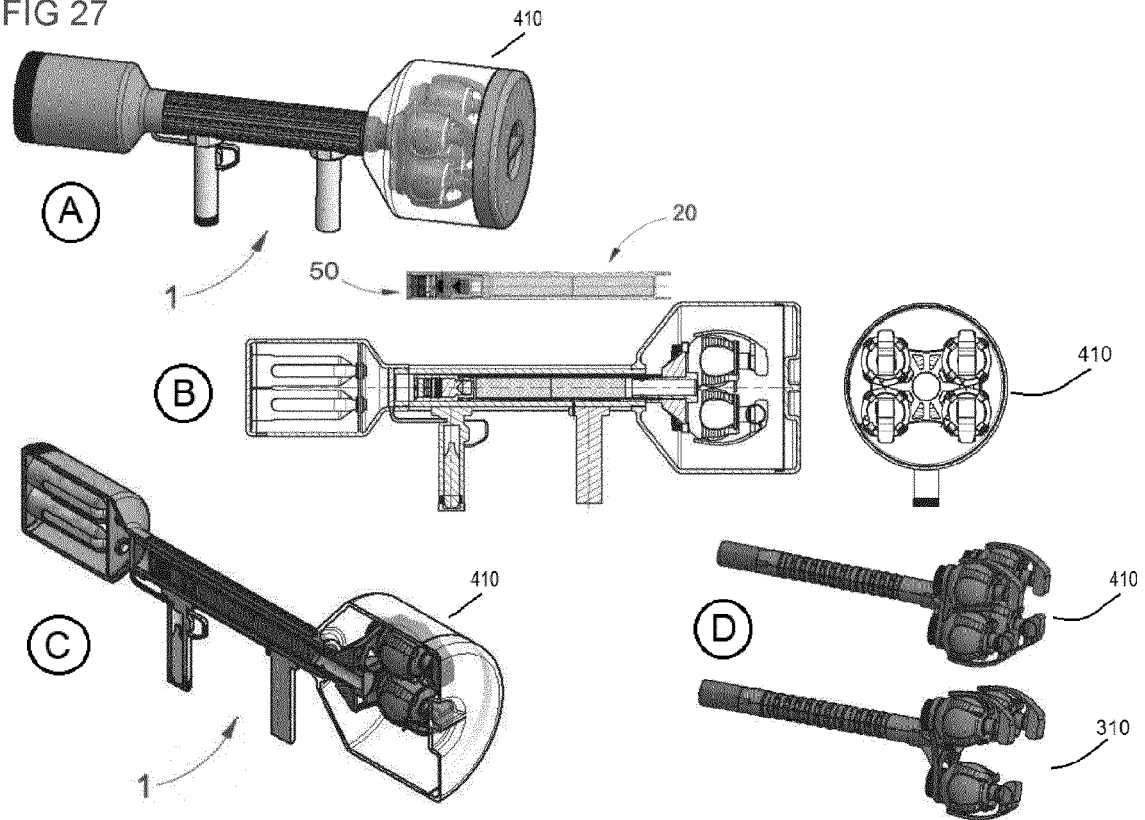


FIG 28

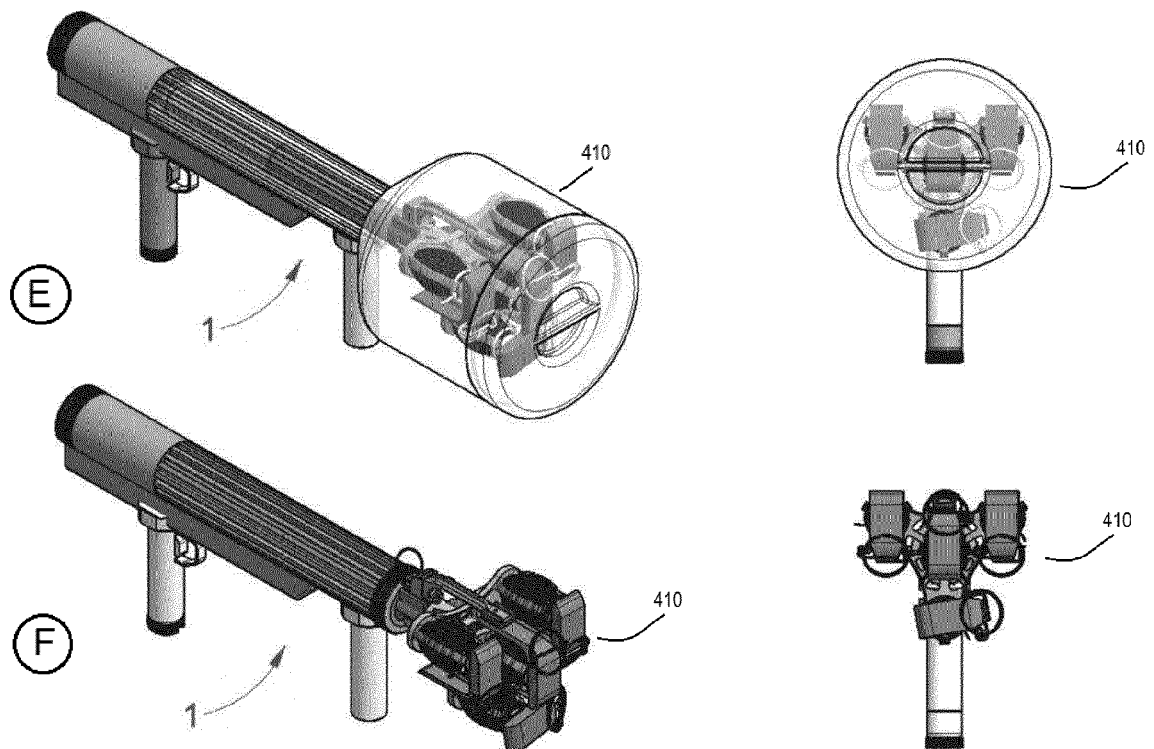


FIG 29

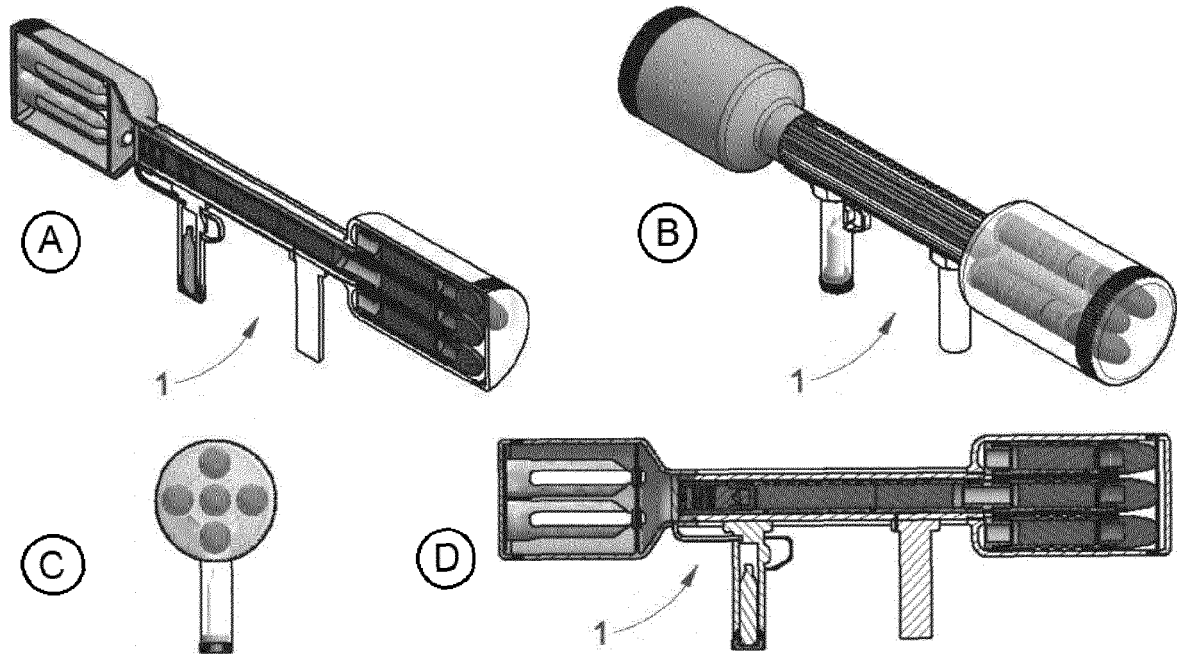
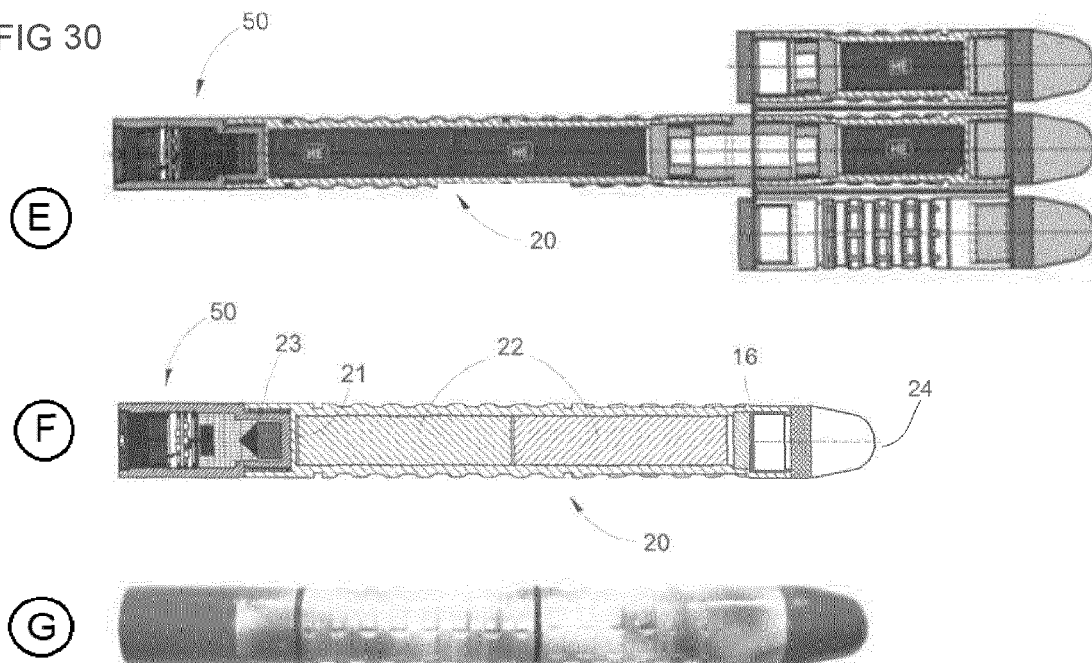


FIG 30





EUROPEAN SEARCH REPORT

Application Number
EP 21 18 7620

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2016/188869 A1 (MYHRE TITO WAAGE [IT]) 1 December 2016 (2016-12-01)	1,5-13, 15	INV. F41B11/62
A	* the whole document *	2-4,14	F41B11/80 F41B7/00
Y	CN 207 515 616 U (CHEN SHAOYUN) 19 June 2018 (2018-06-19)	1,5-13, 15	F42B27/08 F41F1/08
A	* abstract; figures 1-3 * * paragraph [0079] *	2-4,14	F42C15/32 F42C1/10 F42C5/00
Y	WO 2017/009197 A1 (MYHRE TITO WAAGE [IT]) 19 January 2017 (2017-01-19)	9,10	F42C9/14 F42C11/00 F42C15/42
	* abstract; figures 1,3,4 * * page 3, line 33 - page 5, line 4 *		
Y	WO 2020/128461 A1 (BAE SYSTEMS PLC [GB]) 25 June 2020 (2020-06-25)	10	
	* abstract; figures 1,2,4 * * page 8, lines 10-22 * * page 10, lines 6-22 *		
A	IT UB20 155 274 A1 (MYHRE TITO WAAGE [IT]) 5 May 2017 (2017-05-05)	1-15	TECHNICAL FIELDS SEARCHED (IPC)
	* figures 2,5,6 *		F41B F41F F42B F42C
A	FR 2 492 089 A1 (SARMAC SA [CH]) 16 April 1982 (1982-04-16)	1-15	
	* figures 1,2 * * page 3, lines 13-30 * * page 6, lines 29-32 *		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 November 2021	Examiner Schwingel, Dirk
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

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

EP 21 18 7620

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-11-2021

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016188869 A1	01-12-2016	NONE	
CN 207515616 U	19-06-2018	NONE	
WO 2017009197 A1	19-01-2017	NONE	
WO 2020128461 A1	25-06-2020	NONE	
IT UB20155274 A1	05-05-2017		
FR 2492089 A1	16-04-1982	BE 890134 A	01-03-1982
		DE 3140044 A1	29-04-1982
		DE 8129472 U1	11-03-1982
		FR 2492089 A1	16-04-1982
		IT 1137648 B	10-09-1986
		NL 8104334 A	03-05-1982

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 10201800000012 **[0005]**
- IT IB2019050021 W **[0005]**
- IT 102018000003123 **[0005]**
- IT 102018000003125 **[0005]**
- WO 2016188869 A1 **[0008]**
- WO 2017009197 A1 **[0008]**