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Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 218 819
A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 86110219.2

(51) Int. Cl. 4: **F42B 25/00**

(22) Date of filing: 24.07.86

(30) Priority: 25.07.85 US 759049
28.03.86 US 845921

(43) Date of publication of application:
22.04.87 Bulletin 87/17

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: **INDUSTRIAS CARDOEN LIMITADA**
Avenida Providencia 2237 6th Floor
Santiago(CL)

(72) Inventor: **Cardoen, Carlos**
Avenida Providencia 2237 6th Floor
Santiago(CL)

(74) Representative: **Baillie, Iain Cameron et al**
c/o Ladas & Parry Isartorplatz 5
D-8000 München 2(DE)

(54) Multipurpose bomb.

(57) This invention relates to a multipurpose bomb air dropped dispersion, stabilized path fall, launchable from aircraft or missile warhead. The multipurpose bomb has at least three purposes, i.e. incendiary, antipersonnel and armor piercing.

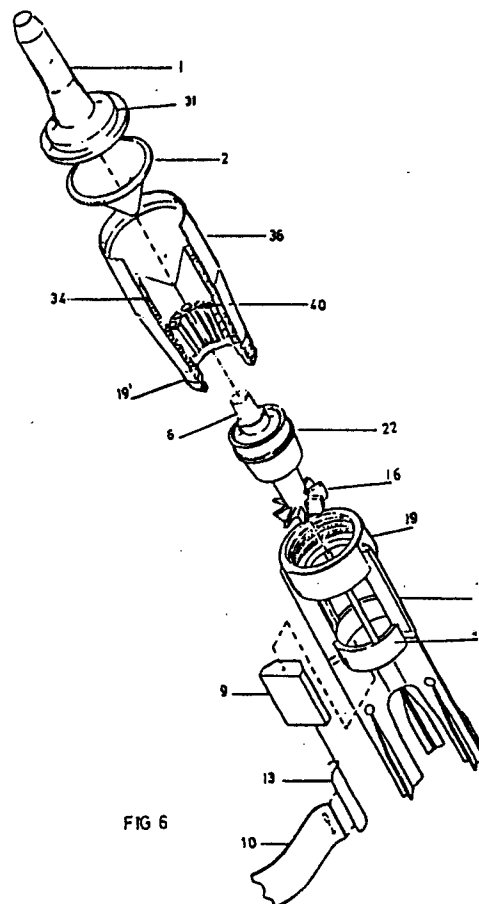


FIG 6

EP 0 218 819 A2

MULTIPURPOSE BOMB

The invention relates to a multipurpose cluster bomb.

A fire bomb comprising an elongated member of combustible material having a hollow portion, a starting charge within the member and means to ignite said charge is disclosed in U.S. Patent 2,329,522.

An incendiary bomb mixture of naphtha with from about 10% to 25% of weight of isoolefin polymers is disclosed in U.S. Patent 2,445,311.

Grenades, particularly hand-thrown, equipped with stabilizer devices to insure impact of the grenade at or within the proper angle thereto, are disclosed in U.S. Patent 2,447,036.

U.S. Patents numbers 3,111,086 and 4,178,851 are also concerned with bombs.

The present invention is concerned with a bomb having three purpose capability simultaneously: antitank, antipersonnel and incendiary.

According to the present invention there is provided an air delivered armor piercing, antipersonnel and incendiary cluster bomb including a casing, an inertial fuze, a firing pin, a firing cap, a blasting cap, an explosive charge and a pin stabilizer at the rear of the bomb casing, characterized in that a rear preamplifier screen is shaped as a frustum with a generatrix-axis angle of $10^\circ \pm 3^\circ$, in that a front cylindrical section is fixed to the large section of the frustum by one end and a cone with a generatrix-axis angle of $30^\circ \pm 10^\circ$ is directed rearwardly, in that an impact plastic hollow nose with a diameter of 0.35 ± 0.1 times the diameter of the container is connected to the cone base with an additional cavity to the cone volume of at least 0.1 of said cone volume, in that an incendiary agent is incorporated in the bomb, and in that the bomb casing is adapted to be fragmented.

The antitank action uses the jet principle. The jet principle is simply the focusing of a greater than normal amount of the heat and energy of the explosion against a very small area. This is accomplished by using a high density, high strength explosive charge formed around a conical metal liner, or glass. When the explosive is detonated, the cone is collapsed and vaporized, forming a small high temperature jet containing particles of liner material moving at velocities of 10,000 to 30,000 feet per second. This strikes the target with such heat and force that the target simply flows radially from the point of impact leaving a deep, nearly round hole.

The principal factors that control the performance of jet charges are the type and weight of explosive, the diameter, material and shape of the cone and the stand-off or distance to the target.

The shell of the bomb is structurally arranged to provide lethal fragmentation as by embossing or grooving its outer metallic surface, or using a ring shaped ball container, being the said container concentrically set to the bomblet body, being the said container filled with metallic balls, particularly steel balls.

The inner shell bomb explosive magazine wall is the carrier of an incendiary element, particularly Zr pills or ring shaped. The said incendiary element is issued either in rings fixed to the inner wall surface or in pills pertaining to an alveolate sleeve, preferably plastic, that is partially a wall for the said ring shaped ball container related to the antipersonnel purpose.

The said explosive magazine is a volume of revolution bounded forward by a metallic or glass cone with its apex pointing backwards and bounded backwards by an inertial fuze assembly with a blasting cap incorporated concentrically to the said explosive magazine all along its length.

A frustum is joined by its larger base to a cylindrical segment with the backward end of the said frustum closed over the smaller base by the inertial fuze and the forward end closed over the cylindrical segment with the said metallic or glass cone. The metallic or glass cone is closed with a stand-off hollow separator and nose normal to the center of the base in opposite direction to the apex.

The invention will now be described by way of example and with reference to the accompanying drawings, in which

Fig. 1 is longitudinal section of a bomb of one embodiment of the invention,

Fig. 2 is view along AA of Fig. 1,

Fig. 3 is a longitudinal section of a detail of Fig. 1,

Fig. 4 is a section of a further embodiment of the invention,

Figure 5 is section along AA of Fig. 4, and

Fig. 6 is an exploded perspective view of the embodiment of Fig. 4.

As is most clearly shown in the exploded view of Figure 6, the bomb of the invention has a casing with a tail at the rear end and a forwardly projecting member, hereinafter referred to as a collider, at the forward end.

The assembly of the component parts is shown in Figures 1 and 2. The collider 1 projects forwardly from an externally grooved casing shell which may be formed from a segment of iron pipe. In a preferred embodiment the iron pipe has a diameter of approximately 1.5 inches (3.81cm). The casing has a cylindrical body portion 3 which merges with a frusto conical portion 5.

The body portion 3 defines an internal cavity 12 which accommodates a blasting cap 6.

Rearwardly of the casing is the tail 7 which, in a preferred embodiment, incorporates three fins made of plastics material and symmetrically disposed at 120° intervals about the longitudinal axis of the bomb.

Figure 3 shows, on an enlarged side, an inertial fuse which is located intermediate the casing shell and the tail. As shown in Figure 3, the blasting cap 6 projects from the fuse and is retained in position by a crown 30 which is seated over an opening defined in the fuse body 22.

An incendiary material is incorporated in the bomb. In a preferred embodiment zirconium is used for this purpose and, to this end, rings 4 of zirconium may be positioned internally around the body portion 3.

A cone 2 of material extends downwardly into a conical void 33. The cone base is externally closed by the collider 1 and is set in one piece over base 43 with an additional void 42 which is at least one tenth the volume of the case. The angle of the cone is $30^\circ \pm 10^\circ$ and the collider (nose) is of plastics material with a diameter 0.35 ± 0.1 times the diameter of the casing.

A preamplifier screen is frustum shaped with an angle of $10^\circ \pm 3^\circ$.

As pointed out, the casing is externally grooved at 8 for improving the necessary fragmentation for antipersonnel purposes.

The above described assembly is disposed within a cluster of projectiles. Before so disposing the assembly with the cluster a hook 11, which is a safety device for transportation, is removed.

The hook 11 is operable to prevent rotation of the shaft 14 during transportation. In one embodiment the hook is fixed to a piece of expanded polystyrene, or the like, between two consecutive turbine blades, preventing rotation and secured by a cotton tape, and a flag, that is rolled at least 3 times around the tail fin.

Turning now to Figure 3 of the drawings, the inertial fuze includes a firing pin carrier 21 in the form of a sliding guide sleeve for the interior firing cap carrier 18, 18'.

A firing pin 17 extends downwardly from below the blasting cap 6 longitudinally into the carrier 21. A coil spring 15 is located within said carrier 21 and surrounds said firing pin 17. When the firing pin 17 is installed, it is held apart from a firing cap 25 by the pressure of said spring 15.

A shaft 14, which may be grooved, extends downwardly from the firing cap 18 and is secured by means of a threaded portion 26 remote from said firing cap seated in a threaded bushing 24. Rotation of the threaded bushing by wind action on a coupled vane or turbine 16 will cause the shaft to

travel downwards. When the shaft presses below the carrier 18', balls 23 are able to move toward each other.

Now, a sudden retardation will push the said balls into sleeve 21, spring 15 will be compressed and the firing cap 25 will be driven into contact with the firing pin 17 and blast will occur.

The high explosive blasted in 12 is a shaped charge according to cone 2, that will induce the antitank purpose, improved with separator 1. Grooving 8 improves fragmentation for antipersonnel purposes. The incendiary purpose is obtained with the above Zr rings.

The double walled explosive container is best shown in Figs. 4 and 5.

The inner wall is 35-41, the outer wall is 36-39. Between said walls, balls 34 are installed. This solution gives adequate antipersonnel results, when the explosive in 12 is blasted.

Figs. 4 to 6 show an alveolate container or cavity with separator members 38, with plastic tube containers 42 that in a total of 10 units are set at 36° equally spaced. Since each tube is able to carry 4 zirconium pills, that achieves an incendiary charge 4 times larger than the ring solution described with reference to Fig. 1.

Claims

1. An air delivered armor piercing, antipersonnel and incendiary cluster bomb including a casing (3), an inertial fuze, a firing pin (17), a firing cap - (25), a blasting cap (6), an explosive charge and a fin stabilizer (7) at the rear of the bomb casing, characterized in that a rear preamplifier screen is shaped as a frustum with a generatrix-axis angle of $10^\circ \pm 3^\circ$, in that a front cylindrical section is fixed to the large section of the frustum by one end and a cone with a generatrix-axis angle of $30^\circ \pm 10^\circ$ is directed rearwardly, in that an impact plastic hollow nose with a diameter of 0.35 ± 0.1 times the diameter of the container is connected to the cone base with an additional cavity to the cone volume of at least 0.1 of said cone volume, in that an incendiary agent is incorporated in the bomb, and in that the bomb casing is adapted to be fragmented.

2. A bomb according to claim 1, characterized in that incendiary agent is rings of zirconium secured around the inside of the bomb casing.

3. A bomb according to claim 1, characterized in that the incendiary agent is zirconium in a plurality of pills within an alveolate plastic structure set in an inner screen surface, shaped as a concentric structure to the screen frustum, with alveols along its generatrix, angularly distributed equally around 360° , preferably in 10 units, with 4 Zr pills in each.

4. A bomb according to claim 1, characterized in that the inertial fuse has a body of plastics material.

5. A bomb according to claim 1, characterized in that fragmentation is attained using an externally grooved (8) metallic shell body.

6. A bomb according to claim 1, characterized in that fragmentation is attained using a double walled explosive container (35, 41: 36, 39) with the interwall space filled with spheroid shaped metallic fragments (34).

7. A bomb according to claim 6, characterized in that at least the inner wall (35, 41) is made of plastics material.

8. A bomb according to claim 7, characterized in that the internal plastic wall is built in the same mold with an alveolate plastic structure set in the inner screen surface, shaped as a concentric structure to the screen frustum, with alveols along its generatrix, angularly distributed equally around 360°, preferably in 10 units, with 4 Zr pill in each.

9. A bomb according to claim 1, characterized in that the fuze has a fire cap carrier that is a guide for a shaft coupled to an air turbine (16) that acts as the fuze arming device.

10. A bomb according to claim 9, characterized in that the hook like device (11) is employed to avoid rotation of the turbine during transportation.

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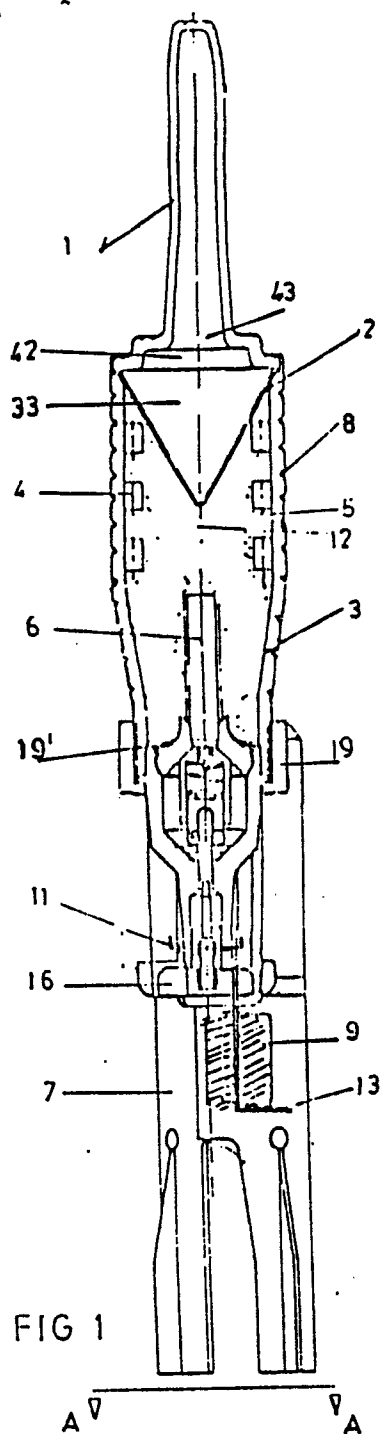


FIG 1

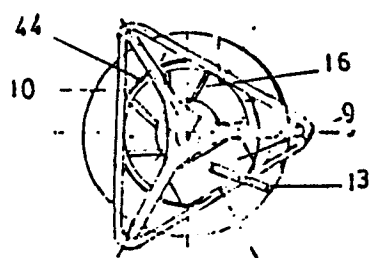


FIG 2

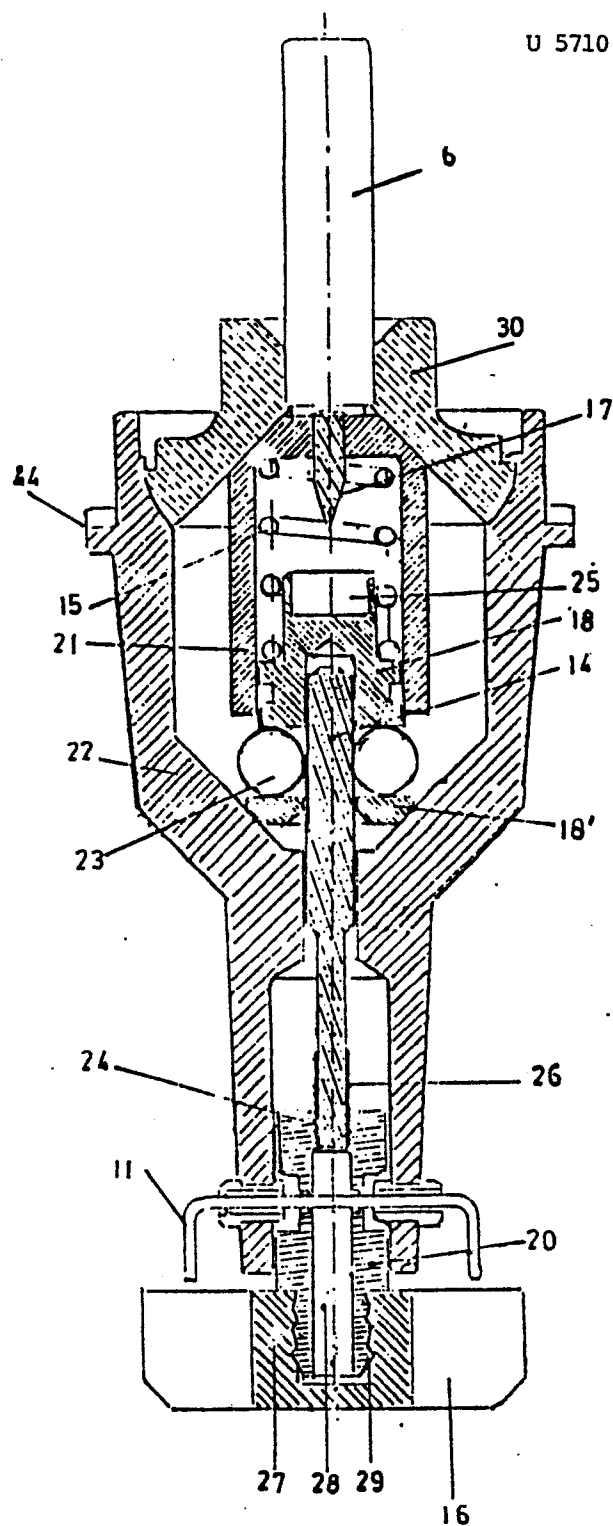


FIG 3

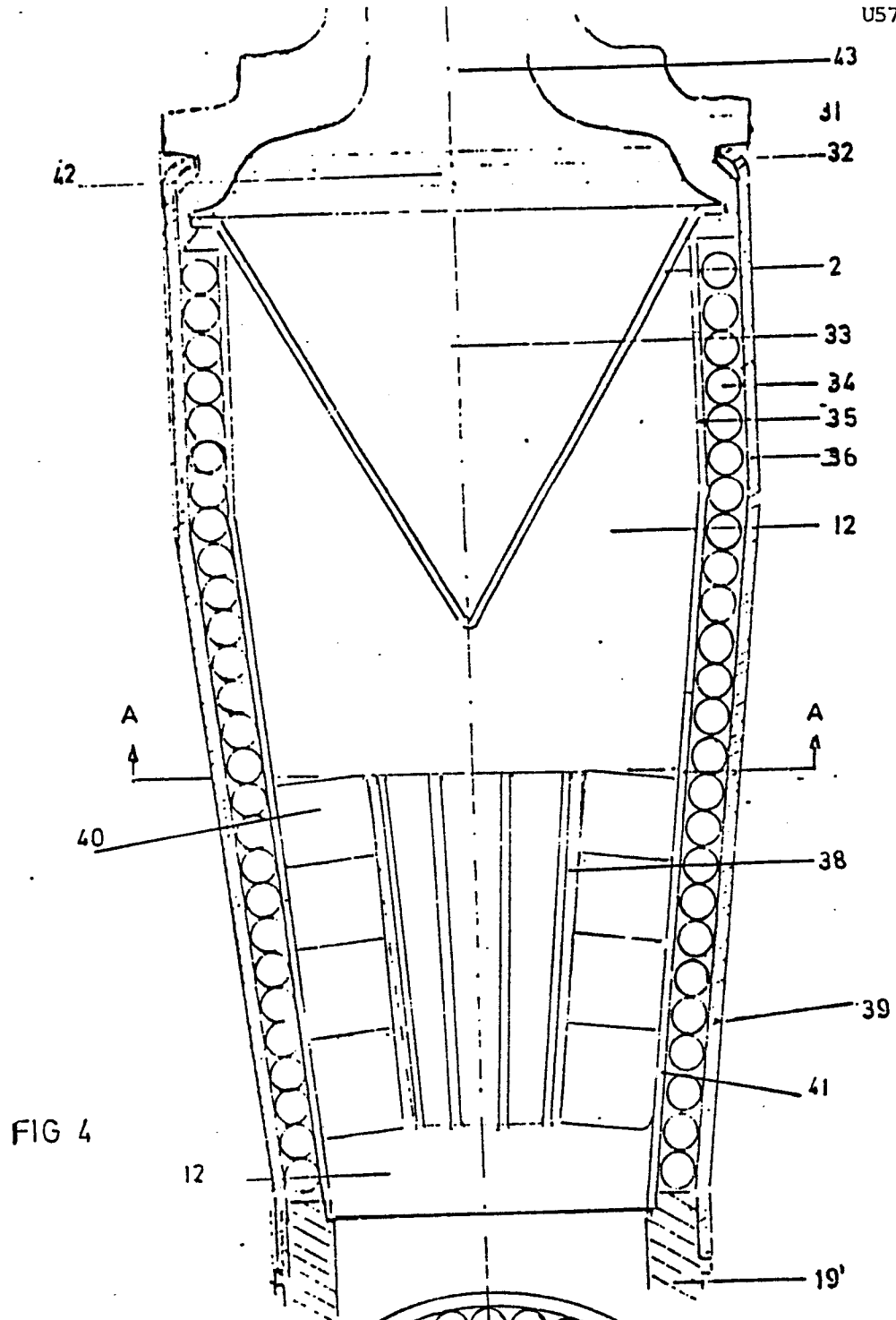
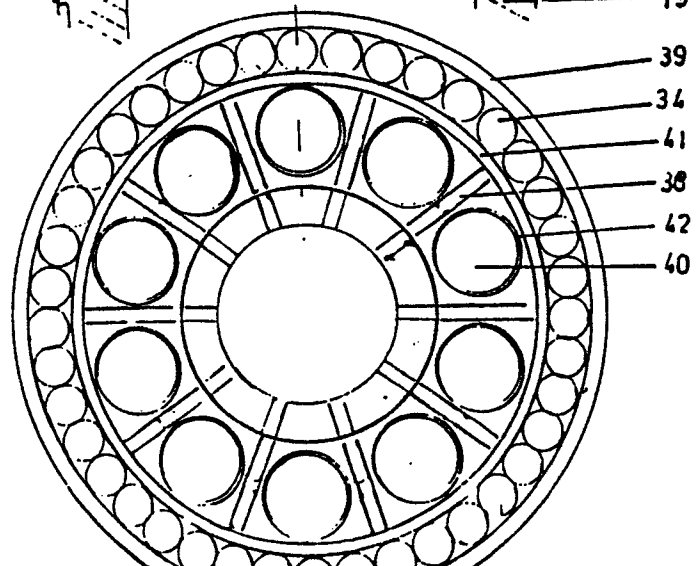


FIG 5



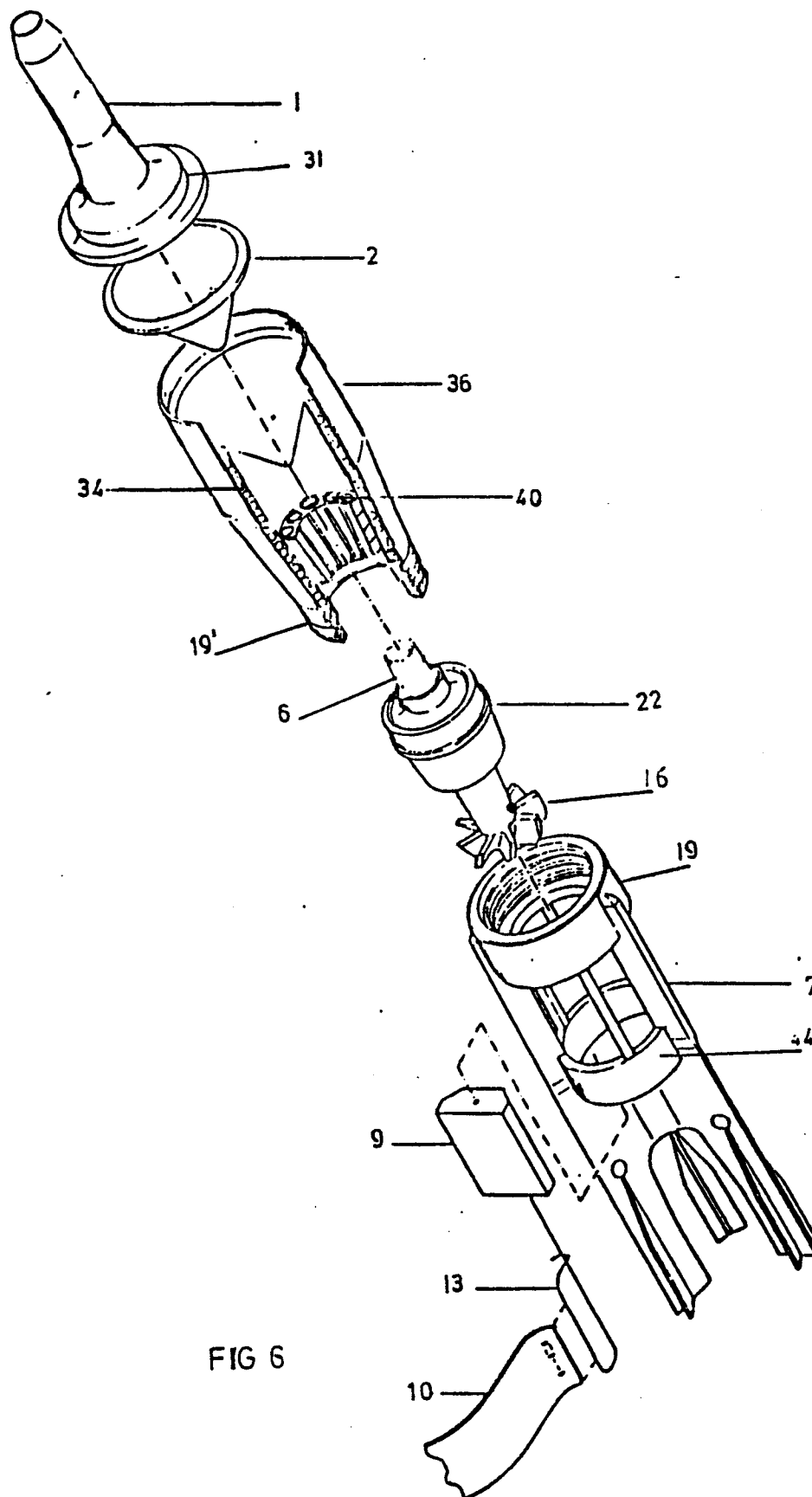


FIG 6