June 13, 1967 W. GAHLE 3,324,794

SMOKE GRENADE

Filed June 3, 1965

Fig. 1

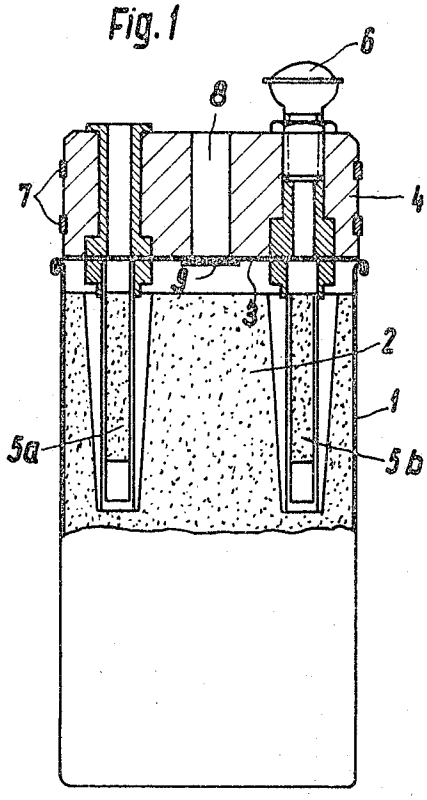


Fig. 2

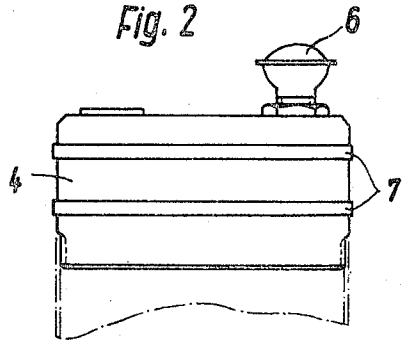


Fig. 4

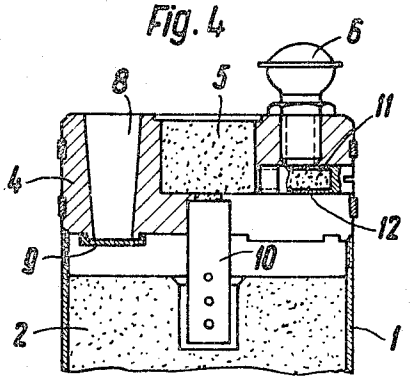


Fig. 3

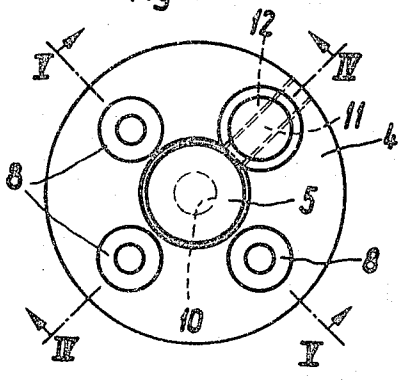
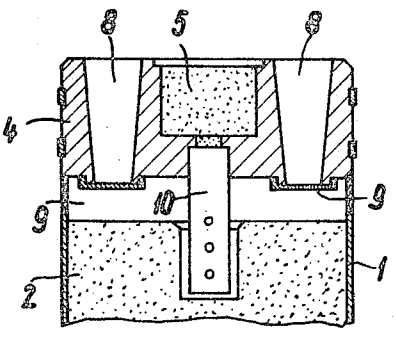


Fig. 5



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United States Patent Office 3,324,794 Patented June 13, 1967

3,324,794

SMOKE GRENADE

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Filed June 3, 1965, Ser. No. 461,090
Claims priority, application Germany, June 4, 1964, R 38,059
2 Claims. (Cl. 102—65)

ABSTRACT OF THE DISCLOSURE

A smoke grenade having an impact and pressure-resistant casing containing a smoke charge and an open end with a contact head contacted on the casing at the open end and having a friction igniter and a plurality of ducts therein grouped around a central ignition means.

This invention relates to a smoke grenade which can either be thrown by hand or launched from a cup discharger.

Smoke grenades of this type consist essentially of a thin-walled tin plate container containing the smoke charge. The cylindrical wall of the container is rolled from a sheet-metal blank and has a longitudinal seam and is connected to the bottom of the container by a flanging operation. The top of the container is sealed by means of a lid, the rim of which is also flanged over the cylindrical wall. Smoke grenades of this type which are intended to be launched from a cup discharger are provided with a contact head, screw-connected to the lid and having propulsion and ignition means. The propellant charge contains a primer pellet, connected by electrical wiring to two contact rings, recessed into the periphery of the contact head, and when a voltage is applied to the primer pellet by means of the contact pins arranged in the cup discharger, the pellet fires the propellant charge which not only launches the smoke grenade from the cup discharger, but also causes a priming charge to ignite the smoke-forming composition. Apart from this first priming charge which is ignitable by the propellant charge, the contact head is provided with a second priming charge, which is ignitable by means of a friction igniter. The friction igniter is only used when the smoke grenade is to be thrown by hand. The generation of heat in the smoke grenade ensures that even when the grenades are thrown by hand the non-used propellant and priming compositions are ignited and thus rendered harmless.

Smoke greades of the above-described kind which have a thin-walled tin plate container as a casing, have proved quite satisfactory in practice. Not only do they function very well, but they are characterized by comparatively low manufacturing costs and low weight. However, in extreme conditions of use, for example, when the smoke grenade hits hard rock or frozen ground there is the possibility that the comparatively thin tin plate casing is badly deformed and breaks or bursts.

In such a case the smoke would be able to escape not only through the intended points located in the lid or the contact head, but also at other points, so that the period over which the grenade generates smoke could no longer be accurately determined.

The present invention provides a smoke grenade which is capable of being launched over a maximum range of about 50 m., required for tactical reasons, and which has a more accurately determined smoking period under extremely hard conditions.

The smoke grenade of the invention has for an object to provide an impact and pressure-resistant casing, which consists of a bottom and a seamless cylindrical wall portion. The container may be produced in one piece from

a disc-shaped circular sheet-metal blank in no more than two drawing operations. The wall thickness achieved in this way is quite uniform and need not be greater than about 0.75 mm. Compared with the wall thickness of about 0.52 mm. of the conventional tin plate container, the surplus weight of the container is irrelevant when related to the overall weight of the smoke grenade. In addition the entire internal equipment may be used in this container without dimensions of the container will not affect the range achieved with the cup discharger. Notwithstanding that the wall thickness is very small for a deep drawing operation and allows the lid to be fastened by a flanging operation, the container is strong enough to withstand not only the internally generated gas pressure but also the hardest impact on landing.

It is, of course, possible to achieve similar pressure and impact-resistant properties with a container, which is produced like a spray capsule from one-piece or two-piece sheet-metal pressing, the bottom of which is of inward-curving shape.

Further object of the invention resides in the fact that the container may be provided with an internal thread towards its open end, so that the contact head may be screwed onto the container, eliminating the need for a lid and providing a grenade with a completely flush outer surface. In this way, not only a genuine saving of cost and weight can be achieved, but the contact head may be simply connected to the container without having to use complicated and expensive flanging devices.

The invention has for a further object to provide a smoke grenade having an improved contact head which houses the propellant and the primer. Instead of two priming charges, the contact head has only one priming charge, this single priming charge being optionally ignitable either by hand with a friction iginter, or electrically from a cup discharger. This gives the advantage that not only is one complete priming charge saved, but also additional space is available in the contact head for enlarged areas of controlled rupture.

The invention will now be described in greater detail by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a longitudinal elevation partly in section showing a smoke grenade of conventional design, with a one-piece container in accordance with the invention in longitudinal part section;

FIG. 2 is a side elevation showing a smoke grenade with a contact head capable of being screwed onto the container;

FIG. 3 is a plan view showing a smoke grenade with central ignition;

FIG. 4 is a longitudinal section of a smoke grenade taken on the line IV—IV of FIG. 3 in the direction of the arrows; and

FIG. 5 is a longitudinal section taken on the line V—V of FIG. 3 in the direction of the arrows.

The smoke genade consists essentially of a pressure and impact-proof seamless container **1** which has been manufactured in one piece by a deep drawing operation. The container **1** is filled with a smoke generating composition **2** and is closed by a lid **3** which seals the open top of the container **1** and has been firmly connected to the cylindrical wall of the container **1** by a flanging operation. A contact head **4** is mounted on the lid **3** and connected thereto by means of stay bolts (not shown). The contact head **4** is provided with a propellant charge **5**, FIGS. 3 to 5, and two primer charges **5***a*, **5***b*, FIG. 1. In order to enable the smoke grenade to be optionally used as a grenade or a missile, one of the primer charges, **5***b*, is ignitable by means of a friction igniter **6**. Contact rings **7** on the circumference of the contact head **4** are

connected by electric wires (not shown) to a primer pellet (not shown) projecting into the propellant charge **5**. The primer pellet is ignited when a voltage is applied to it and when the circuit including the primer pellet is closed via the contact rings **7** by means of contact pins provided in a cup discharger (not shown) which contact the contact rings **7**.

A smoke escape duct **8** is provided in the contact head **4**, the end of the duct **8** which is nearest to the smoke generating composition **2**, being sealed with a blow-out diaphragm **9** preferably consisting of shellac-impregnated tissue. As is well known, the blow-out diaphragm **9** constitutes a so-called controlled rupture point which bursts after a sufficiently high internal pressure has built up, without the lid **3** or the contact head **4** suffering damage or being torn from their support. The advantage of the blow-out diaphragm **9** consisting of an impregnated tissue as compared with fuses or foils which have hitherto been used to seal the escape ducts **8** is that the manufacture of the former is less complicated and cheaper than that of fuses, and that they are much less sensitive than simple foils.

Since the wall thickness of the container **1** makes it possible to provide a rolled internal thread in the sealing region, as shown in FIG. 2, the invention allows an externally screw-threaded contact head **4** to be connected to the container **1** simply by screwing, the lid **3** being thus eliminated. The resultant advantages are not only a flush outer surface and a saving in weight and manufacturing costs, due to the elimination of the lid **3**, but also the simplicity of assembling the contact head **4**. Obviously, also in this lidless design, the lower edge of the contact head **4** is spaced apart from the upper edge of the smoke charge **2** by a distance sufficiently large to allow a slow build-up of pressure in this cavity to take place after ignition of the smoke charge.

The contact head **4** is distinguished by essential improvements and simplifications. Thus, the head may be provided with only a single primer charge **10**, instead of two primer charges **5***a*, **5***b*, this single charge being itself optionally ignitable either by means of a friction igniter **6** or, electrically, from the cup discharger. The primer charge **10** which is ignited by a propellant charge **5**, is therefore located, like the latter, in the centre of the contact head **4**. In addition, the propellant charge **5** is connected to a delayed-action charge **11**, embedded in a small tube **12** that can be screwed into a radial bore of the contact head **4**. The delayed action charge **11** is ignitable by means of a friction igniter **6** which can be screwed into the bottom of the contact head **4**. Thus,

altogether two mutually independent ignition facilities exist of which one follows a path from the electrically ignitable primer pellet, from the propellant charge **5** and the primer charge **10** to the smoke charge **2**, whereas the other leads from the friction igniter **6**, the delayed-action charge **11**, the propellant charge **5** and the primer charge **10** to the smoke charge **2**.

The elimination of a second primer charge in this type of contact head **4** allows escape ducts **8** of adequate size to be provided which are arranged at a distance around the propellant charge **5**. At the ends facing the smoke charge **2**, the ducts **8** which are preferably frusto-conical are provided with controlled rupture points **9** which may be formed of tissue plates **9** impregnated with synthetic shellac or the like.

I claim:

1. A smoke grenade comprising an impact and pressure-resistant casing having a bottom and a seamless cylindrical wall portion with the casing containing a smoke charge and an open end, a contact head contacted on the casing at its open end, the contact head being provided with ignition means and with points of controlled rupture, a friction igniter, and a plurality of frusto-conical escape ducts with the ducts grouped around a central ignition means and at a distance therefrom, the duct ends facing the smoke charge being in the form of controlled-rupture points and the ducts widening in the direction away from the smoke charge.

2. A smoke grenade comprising an impact and pressure-resistant casing having a bottom and a seamless cylindrical wall portion with the casing containing a smoke charge and an open end, a contact head contacted on the casing at its open end, the contact head being provided with ignition means and with points of controlled rupture, a rupture points and the ducts widening in the direction away from the smoke charge, and the controlled-rupture points consisting of small tissue discs impregnated with synthetic shellac.

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