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Thurston et al.

[11] **3,797,394**

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[54] **CHAFF DISPENSER, METHOD OF DISPERSING CHAFF**

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[73] Assignee: **Thiokol Chemical Corporation,** Bristol, Pa.

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[52] **U.S. Cl.** ..... **102/37.6,** 102/37.1, 343/18 E

[51] **Int. Cl.** **C06d 1/04,** H01q 15/00

[58] **Field of Search** ..... 102/37.6, 34.4, 35.4, 35.6, 102/49.5, 63, 89; 343/18 E

[56] **References Cited**

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3,593,664	7/1971	Davis et al.	102/35.6
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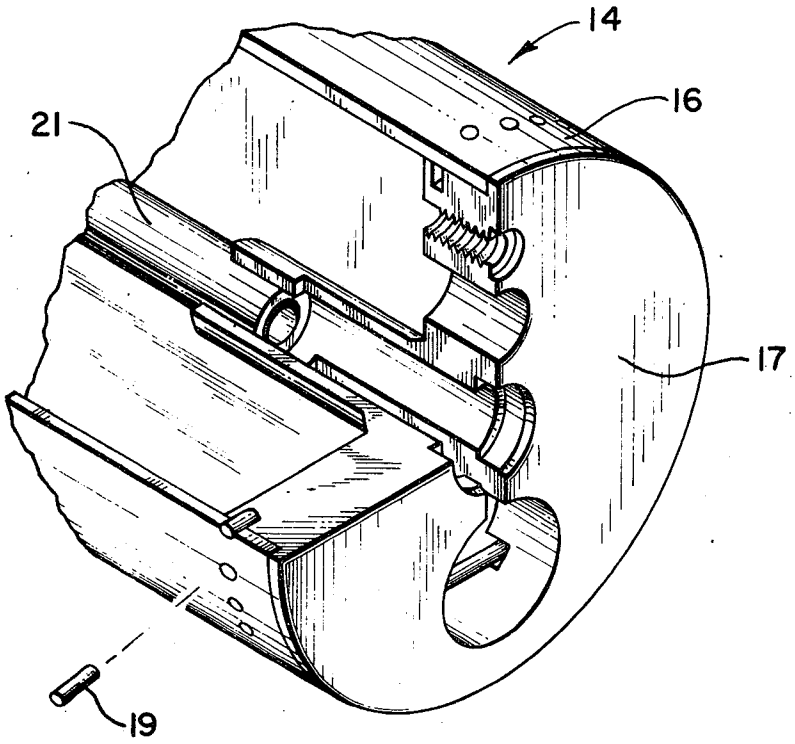
Primary Examiner—Robert F. Stahl

Attorney, Agent, or Firm—Robert J. Grassi

[57] **ABSTRACT**

A chaff dispenser for signals and other uses, which ejects from a moving craft and disperses the signal material after a pre-set delay time, comprises an outer case, a canister holding the chaff and explosive charge, a timer, and a parachute. Upon ejection, the timer measures the delay time, releases itself and the parachute which pulls the canister from the outer case. The canister explodes to disperse the chaff. The invention herein described was made in the course of or under contract with the U.S. Air Force (Contract F33657-72-C-0136).

10 Claims, 5 Drawing Figures



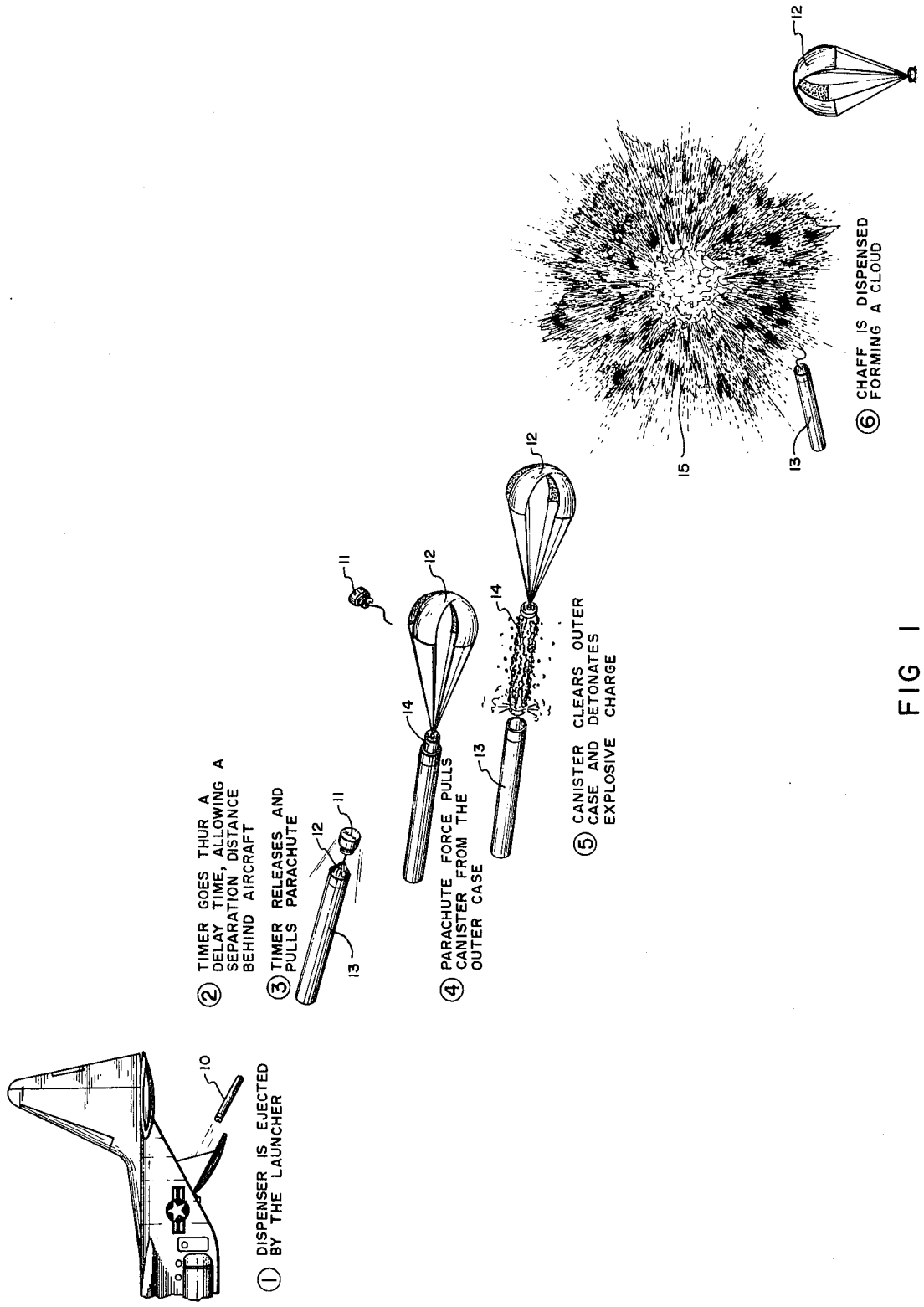

① DISPENSER IS EJECTED BY THE LAUNCHER
10
② TIMER GOES THUR A DELAY TIME, ALLOWING A SEPARATION DISTANCE BEHIND AIRCRAFT
③ TIMER RELEASES AND PULLS PARACHUTE
11
12
13
④ PARACHUTE FORCE PULLS CANISTER FROM THE OUTER CASE
14
⑤ CANISTER CLEARS OUTER CASE AND DETONATES EXPLOSIVE CHARGE
⑥ CHAFF IS DISPENSED FORMING A CLOUD
15

FIG 1

FIG 2

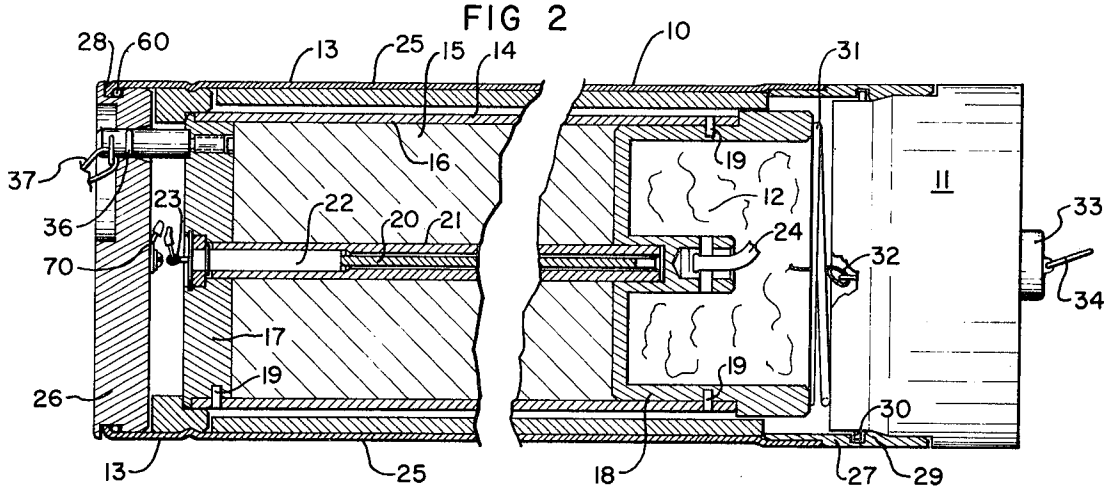


FIG 3

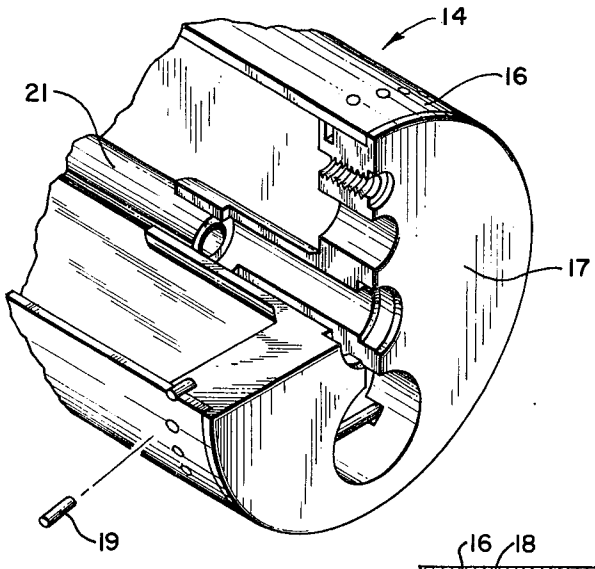


FIG 5

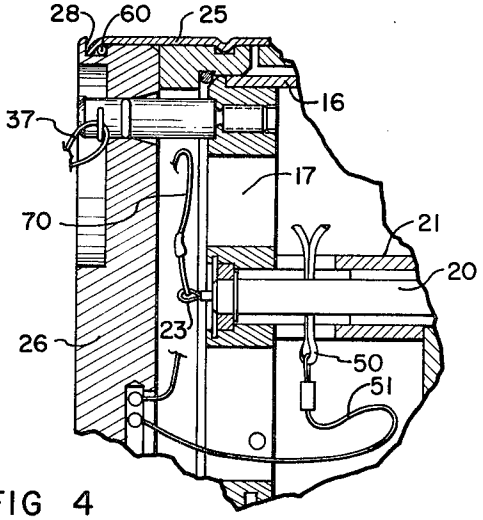
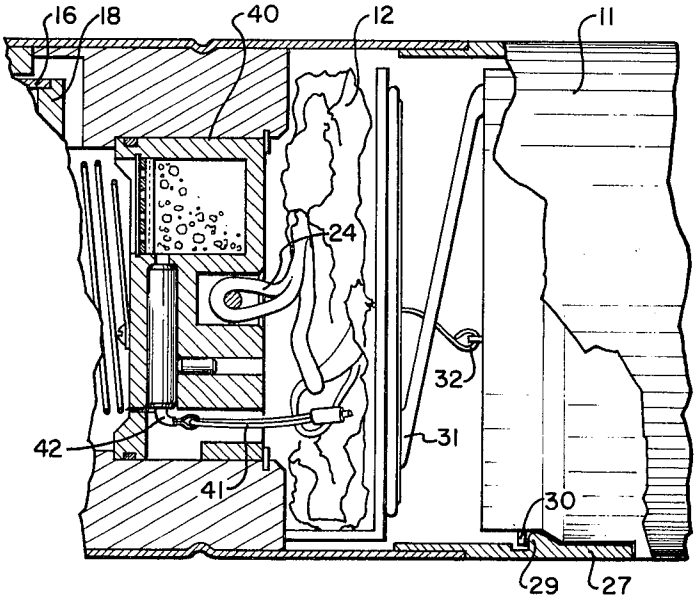


FIG 4



CHAFF DISPENSER, METHOD OF DISPERSING CHAFF

BACKGROUND OF THE INVENTION

1. Field of the Invention

An aerial signal and illuminant device, particularly for dispensing chaff.

2. Description of the Prior Art

A flare using a parachute to guide and slow the descent of a flare unit ejected from a moving craft, as described in U.S. Pat. 3,593,664, is not applicable for rapid display of a signal in a fixed pattern at a predetermined time and distance from a moving craft. In flares the objective is to keep the flare burning as long as possible while slowly descending.

In signal display and chaff dispersements, the objective is to rapidly display a signal of a particular pattern at a predetermined time and distance from charge, moving craft. This requires delaying the dispersion of the signal until the predetermined distance from the craft is reached, and then rapidly dispersing the chaff in a particular signal pattern while the chaff holder is still in motion.

This invention solves the problem by using a specially constructed dispenser. The dispenser has a container means to hold the chaff material and an explosive charge and the container means fits into an outer case which also has a parachute or other pulling means and a timer. The dispenser ejects from the moving craft, and the timer measures the delay time, then springs away from the dispenser pulling out the parachute which then pulls out the container means and activates it to explode and disperse the chaff in a signal pattern.

SUMMARY OF THE INVENTION

A chaff dispenser, suitable for ejecting from a launching unit, comprises an outer case, a releasable timer means for measuring a pre-set delay time, a container means for holding and dispersing the chaff, and a first pulling means for removing the container means from the outer case and activating it. The releasable timer means movably attaches to the outer case, and is adapted to attach to the launching unit. The releasable timer means releases itself from the outer case after measuring the pre-set delay time. The container means for holding and dispersing the chaff movably mounts within the outer case. The first pulling means attaches to the releasable timer means and to the container means for holding and dispersing the chaff. The releasable timer means is attached to the launching unit when the dispenser is placed therein. Upon ejection, the timer means measures the pre-set delay time, then releases itself and activates the first pulling means to pull the container from the outer case, which activates the container to disperse the chaff in a predetermined pattern when the container means is separated from the outer case.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the operation of a chaff dispenser.

FIG. 2 shows a side view of a chaff dispenser equipped with a parachute.

FIG. 3 shows a cutaway view of a canister.

FIG. 4 shows a side view of a chaff dispenser equipped with a parachute and a gas generator.

FIG. 5 shows a side view of one end of a chaff dispenser equipped with a safety means.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The operation of the chaff dispenser **10** is shown in FIG. **1.** When the dispenser **10** ejects, the releasable timer means **11** starts and measures the pre-set delay time, and then springs away and pulls out the first pulling means, parachute **12,** from the outer case **13.** The parachute **12** pulls out and activates the container means for holding and dispersing the chaff, canister **14,** which contains an explosive charge and chaff material **15.** When the canister **14** clears the outer case, the explosive charge detonates and disperses the chaff **15.**

The term chaff, in this invention, refers to any dispersable material, or article, such as dyes, fluorescent or phosphorescent powders or granules, reflective materials such as aluminum strips of foils, etc. which could be used for signals, markers, or reflectors.

One embodiment of a chaff dispenser **10** is shown in FIG. **2.** The chaff **15** packs into a container means for holding and dispersing the chaff, which in this embodiment is canister **14,** which has the same shape as the outer case **13,** preferably a cylindrical shape. The canister **14** has a canister shell **16,** preferably of plastic materials, for example phenolic paper or thin metal sheeting, i.e., aluminum which connects to a first end cap **17,** and a second end cap **18** by connecting means such as drive lock pin **19.** A center tube **21** containing an explosive charge **20** attaches to the end caps **17** and **18** by threads, welding, or epoxy bonding. Within one end of the center tube **21** there is a detonator charge **22** which fires the explosive charge **20.** Lanyard **70** connects to sear pin **23,** these being the means for initiating the detonator charge **22** when the canister **14** is pulled from the outer case. The sear pin **23** fits within one end of the center tube **21.** End cap **18** holds a first pulling means, parachute **12,** which attaches by its riser **24** to the end cap **18.** This attachment can be by bonding with an adhesive, or by attachment to a screw or a ring. The sear pin **23** activates the container means of this embodiment when the container means **14** is pulled out of the outer case by the first pulling means.

The canister **14** fits within the outer case **13,** the walls **25** of which attach to a bottom plate **26** and to a top plate insert **27.** The bottom plate **26** can integrally attach by welding or bonding, but the preferred method is by pressing the ends of the outer case wall **25** over an O-ring retainer **60** into a groove **28.** The top plate insert **27** can be an integral part of the outer case wall **25,** but preferably is a separable piece which welds or bonds to the outer case wall **25.** This insert **27** has an outer lip groove **29.** An adjustable timer **11,** such as a spring-wound type with detent arms **30** or lugs, or other releasable locking means as described in U.S. Pat. No. 3,595,664, fits within the insert **27,** with detent arms **30** engaged within the outer lip groove **29.** A spring **31** in a compressed state lies between the timer **11** and the end cap **18.** A lanyard **32** attaches to the timer **11** and to the top of the parachute **12.** The timer **11** has a timer starter **33,** such as a rotatable knob which activates upon pulling by a second pulling means, lanyard **34,** which connects to the launching unit. The releasable timer means comprises the adjustable timer **11,** with its releasable locking means **30,** the detent arms, spring **31** and lanyard **32.**

In operation, the lanyard **34** is connected to the launching unit and pulls the knob **33** when the dispenser ejects. The timer measures the predetermined delay time, i.e., from 0.2 to 2 seconds, then the detent arms or other timer locking means disengages from the groove **29** and the spring **31** forces the timer from the outer case **13.** The timer **11** pulls the parachute **12** out of the end cap by means of lanyard **32.** The wind force upon the parachute coupled with the forward momentum of the dispenser pulls the canister **14** out of the outer case **13** and the canister **14** is activated when lanyard **70** pulls the sear pin **23** to fire the detonator charge **22,** which detonates the explosive charge **20.** The explosive force disperses the chaff **15** in a predetermined shape.

In another embodiment of the invention, a lug pin **36** fits into and connects the end cap **17** of the canister **14** with the bottom plate **26** of the outer case **13,** and lanyard **37** attaches to the lug pin **36.** This lug pin prevents the accidental actuation of the dispenser unit by holding the canister within the outer case, even if the parachute is activated. The lug pin **36** is pulled out by lanyard **37** prior to placing the dispenser in the launching unit. The lug pin **36** and lanyard **37** comprises the first safety means for preventing the container means from being pulled out of the outer case until the pulling means is actuated. In place of the lug pin **36** and lanyard **37,** a bolt can be used which screws into the canister.

Another embodiment shown in FIG. **4** employs gas pressure obtained from a gas generator **40** and a parachute **12** to pull the canister **14** from the outer case **13.** The gas generator **40** is sufficient in itself to force the canister **14** from the outer case **13.** It can be used alone. As shown, a lanyard **41** connects to the gas generator sear pin **42** and the parachute **12.** The lanyard **41** pulls the gas generator sear pin **42** when the timer **11** releases and pulls out the parachute. The gas generator sear pin **42** activates the generator **40** and the gas pressure builds up and forces canister **14** out of the outer case **13.**

Another embodiment, shown in FIG. **5,** has a safety pin **50** attached to lanyard **51,** which attaches to the bottom plate **26** of the outer case **13.** This safety pin **50** prevents the primer discharge pin **23** from being pulled out during assembly. When the canister **14** pulls away from the outer case **13,** lanyard **51** pulls out the safety pin **50,** which allows firing of the detonator charge **22** by release of sear pin **23.** The safety pin **50** and lanyard **51** comprise a second safety means to prevent the detonator from initiating until the container means is completely pulled out of the outer case.

In dispersing the chaff, the chaff **15** is loaded into the dispenser, the dispenser is put into the launching unit, and the releasable timer means is attached to the launching unit, and then the dispenser is launched. In one embodiment, aluminum strips were loaded into the dispenser and dispersed with a PETN explosive charge loading of 150 grains per foot of cord. The canister was 4 inches in diameter and 3.5 inches in length.

This invention is not limited by the embodiments but by the claims, for equivalents can be substituted without departing from the scope of this invention.

We claim:

1. A dispenser for chaff, suitable for ejecting from a launching unit, which comprises in combination:

an outer case,

a releasable timer means for measuring a pre-set delay time, movably attached to the outer case, and adapted to attach to the launching unit, and to release itself from the outer case after measuring the delay time,

a container means for holding and explosively dispersing the chaff, movably mounted within the outer case, and activated when removed from the outer case, and

a first pulling means for removing the container means from the outer case, said first pulling means connected to the releasable timer means and to the container means, the dispenser adapted and constructed to start the releasable timer means to measure the delay time upon ejecting of the dispenser, and then release itself and activate the first pulling means to pull the container means from the outer case which activates the container means to explosively disperse the chaff.

2. The chaff dispenser, as in claim **1,** wherein the container means for holding and dispersing the chaff is a canister which comprises:

a canister shell with a cylindrical tube shape,

a first end cap adapted to hold the first pulling means, and attached to one end of the canister shell,

a second end cap attached to the other end of the canister shell,

connecting means for connecting the canister shell to the first and second end caps,

an explosive charge,

a detonator charge,

a center tube adapted to hold the explosive charge and detonator charge therein, one end of the center tube connected to the first end cap, and the opposite end of the center tube connected to the second end cap, and

a means for initiating the detonator charge when the container means is pulled out of the outer case, the chaff being held within the space formed by the canister shell, the first and second end caps, and the center tube.

3. The chaff dispenser, as in claim **2,** wherein the chaff dispenser further comprises:

a first safety means for preventing the container means from being pulled out of the outer case until the pulling means is actuated.

4. The chaff dispenser, as in claim **3,** wherein the container means for holding and dispersing the chaff further comprises:

a second safety means to prevent the primer from detonating until the container means is completely pulled out of the outer case.

5. The chaff dispenser, as in claim **4,** wherein the releasable timer means comprises:

an adjustable timer having a starter which actuates upon pulling, said timer adapted to measure a preset delay time and connected to the first pulling means,

a releasable locking means for attachment of the timer to the outer case, and operably connected to the timer to release after the timer measures the pre-set delay time, and

a second pulling means attached to the starter of the adjustable timer and adapted to attach to the launching unit when the dispenser is placed therein, said second pulling means actuating the

starter of the timer when the chaff dispenser is ejected from the launching unit.

6. The chaff dispenser, as in claim **5**, wherein the first pulling means is a parachute.

7. The chaff dispenser, as in claim **5**, wherein the first pulling means is gas pressure.

8. The chaff dispenser, as in claim **7**, wherein the first pulling means is gas pressure obtained from a gas generator.

9. The chaff dispenser, as in claim **5**, wherein the first pulling means consists of a parachute, and gas pressure operating in unison with the parachute.

10. A method of dispersing chaff from a dispenser which is ejected from a moving vehicle to form a well dispersed configuration suitable for decoying a radar guided missile, which dispenser has an outer case and a friable container movably mounted within the case, which comprises:

pulling the friable container from the outer case after a predetermined time after ejection, said container having therein an explosive charge substantially surrounded by chaff, and

detonating the explosive charge to release the explosive force which disperses the chaff into the predetermined configuration.

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