

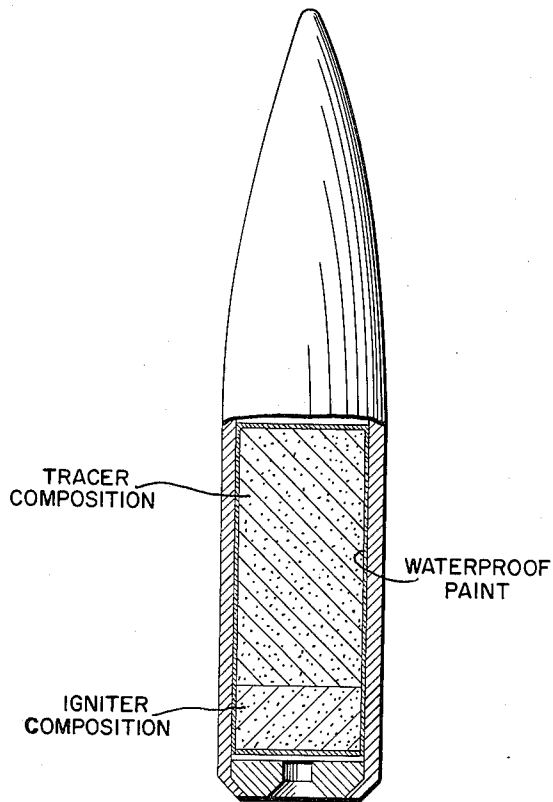
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COMPOSITION FOR TRACER UNIT

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COMPOSITION FOR TRACER UNIT

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now Patent No. 2,899,291, dated Aug. 11, 1959. Di-
vided and this application Feb. 10, 1959, Ser. No.
795,310

2 Claims. (Cl. 52—2)

(Granted under Title 35, U.S. Code (1952), sec. 266)

This invention relates to a tracer ammunition unit
especially adapted for use in 20 mm. projectile and more
particularly, it concerns the combination of an improved
sensitive tracer composition, and a slow burning non-
flash igniter composition therefor.

This application is a division of my copending applica-
tion Serial No. 35,960, filed June 29, 1948, now U.S.
Patent No. 2,899,291, issued August 11, 1959.

Heretofore tracer ammunition used by our Armed
Forces proved unsatisfactory especially when used in night
encounters, in that, under conditions of darkness the flash
therefrom upon ignition of the tracer composition by the
igniter composition caused excessive flash and too much
light streak at the muzzle of the gun, thus illuminating
and disclosing the position of the gun to the enemy and
confusing and misleading the gunner or fire director when
aiming at the gun is accomplished by observation of the
tracer streak. Such tracer ammunition also proved not
altogether satisfactory when used in day encounters in-
asmuch as when the tracer composition was ignited the
tracer streak emitted therefrom was of insufficient intensity
to permit the fire director to follow the tracer streak as
the projectile traveled along a trajectory.

The present invention is especially adapted to obviate
the above mentioned flash and bright streak of light oc-
curring at the gun muzzle as the projectile is fired there-
from, and also producing a tracer streak of sufficient in-
tensity to permit the gunner or fire director to observe
the tracer streak and follow the flight of the projectile
either at night or during the day.

Accordingly, it is an object of the invention to provide
a composition for a tracer unit for a projectile comprising
a new and improved light emitting trace composition in-
cluding a slow burning non-flash igniter composition
therefor.

Another object is to provide a new and improved ig-
niter composition for a tracer unit for a projectile adapted
to delay ignition of a new and improved tracer composi-
tion for a predetermined period of time after the pro-
jectile has been fired from a gun and traveled a substan-
tial distance from the muzzle thereof and in which the
tracer composition, when ignited by the igniter composi-
tion, produces a tracer streak of sufficiently bright intensity
to permit the gunner to follow the flight of the projectile
either at night or during the day as the projectile travels
along a trajectory.

Other objects and advantages of the present invention
will become more apparent during the course of the fol-
lowing description taken in connection with the accom-
panying drawing.

In accordance with the present invention the new and
improved slow burning non-flash or dark igniter composi-
tion for the tracer unit is composed of a mixture of
barium peroxide, antimony sulfide, magnesium, and a lu-
bricant of graphite, and a sensitive light emitting tracer
composition composed of a mixture of magnesium, stron-
tium nitrate, strontium tartrate, hexachlorobenzene, char-
coal, and a binder of stearic acid.

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Referring to the drawing, each of the aforesaid mix-
tures is mixed separately and pressed or moulded into pel-
let form thereby to form a slow burning non-flash igniter
composition pellet and a sensitive light emitting tracer
composition pellet, the tracer unit being completed by
pressing the igniter pellet onto the tracer pellet and there-
after coating the entire tracer-igniter unit with a moisture-
proof paint such, for example, as waterproof paint of the
type known to those skilled in the art as Bakelite Var-
nish No. "XV-1657."

The igniter composition of the present invention may
be obtained by moulding a mixture of the following ingre-
dients, the ingredients being proportioned by percent-
age by weight such, for example, as 76-78.4% barium
peroxide, 18.4-23% antimony sulfide, 0-2.2% magnesium,
and .1-1% of graphite. In preparing the ingredients of
the igniter composition it has been found that the best
results are obtained when the barium peroxide, antimony
sulfide, and magnesium are of such proportions as to
pass through a U.S. standard sieve, mesh size 200 and
the graphite is of such proportion as to pass through a
U.S. standard sieve, mesh size 325.

Now, the nature and purpose of the igniter unit of the
present invention having been indicated in a general way,
the following specific example of the igniter composition
thereof is illustrated together with the mesh size of the
sieve used. In this example the ingredients of the igniter
composition are given in percentages by weight.

Slow burning non-flash igniter composition

Ingredients	Mesh Size	Percentage by Weight
Barium Peroxide.....	200	78.4
Antimony Sulfide.....	200	18.4
Magnesium.....	200	2.2
Graphite.....	325	1.0

The tracer composition of the present invention may be
obtained by moulding a mixture of the following ingre-
dients, the ingredients being proportioned by percent-
age by weight such, for example, as 31.8-38% magnesium,
30.9-38% strontium nitrate, 12-27.3% strontium tar-
trate, 4.6-5% hexachlorobenzene, 2-0.9% charcoal, and
4.5-5% stearic acid. In preparing the ingredients of the
tracer composition, it has been found that the best re-
sults are obtained when all the ingredients comprising
the tracer composition are of such proportions as to
pass through a U.S. standard sieve, mesh size 100.

Now, the nature and purpose of the tracer unit of the
present invention having been indicated in a general way,
the following specific example of the tracer composition
thereof is illustrated together with the mesh size of the
sieve used.

Sensitive light-emitting tracer composition

Ingredients	Mesh Size	Percentage by Weight
Magnesium.....	100	31.8
Strontium Nitrate.....	100	30.9
Strontium Tartrate.....	100	27.3
Hexachlorobenzene.....	100	4.6
Charcoal.....	100	0.9
Stearic Acid.....	100	4.5

As red was found by actual tests to be the best color
for both daylight and night use, a small percentage of
hexachlorobenzene was added to the tracer mixture to
improve this color effect of the trace streak and it was
also found that by the addition of a small amount of
pulverized charcoal to the tracer composition the ignition
thereof was improved, as the addition of the charcoal
when mixed with the other fine powder ingredients of

the tracer composition in the aforesaid proportions decreased the compressibility of the entire mixture, thus making it more porous and improving the ignition thereof.

In preparing the igniter composition it was found that when the barium peroxide, antimony sulfide, and magnesium were mixed with the graphite in the aforesaid proportions, the ignition sensitivity characteristics thereof proved entirely satisfactory and the combustion thereof was sufficiently retarded to ignite the tracer composition in predetermined time delayed relation with respect to ignition of the igniter composition. It was also found that by maintaining the particle size of the antimony sulfide smaller than 200 mesh size, the frictional sensitivity of the particles of which the igniter composition is composed is sufficiently low to prevent premature detonation of the mixture. Furthermore, proper functioning of the tracer unit is obtained when the tracer unit is loaded into the tracer cavity arranged in the projectile with a serrated ram at a pressure, such, for example, as from 30,000-46,000 p.s.i.

From the foregoing description it will be understood that a composition for a tracer unit for a projectile has been compounded and constructed in which the igniter composition thereof is adapted to delay ignition of the light emitting tracer composition thereof for a predetermined period of time after ignition of the igniter composition as the projectile is fired from a gun whereby ignition of the tracer composition will occur a substantial distance from the muzzle of the gun such, for example, as from 75 to 125 yards, thereby preventing area illumination of the battery, and also preventing the flash upon ignition of the trace composition from producing a blinding effect on the gunner.

Furthermore, the present invention is adapted to improve the daylight visibility of the tracer streak emitted from the tracer composition, such tracer streak being sufficiently bright to permit the gunner to observe and follow the streak as the projectile travels along a trajectory.

From the foregoing description it will be understood that ignition of the tracer composition by the igniter composition and the appearance of the tracer streak therefrom will not occur until a predetermined period of time has elapsed after ignition of the igniter composition.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

The invention herein described and claimed may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A slow-burning, non-flash igniter mixture for a tracer unit consisting essentially of 76 to 78.4% barium peroxide, from 18.4 to 23% antimony sulphide, up to 2.2% magnesium, and containing an amount up to 1% graphite.

2. A slow-burning, non-flash igniter composition for a tracer unit consisting essentially of 76 to 78.4% barium peroxide, from 18.4 to 23% antimony sulphide, and up to 2.2% magnesium.

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