

March 25, 1969

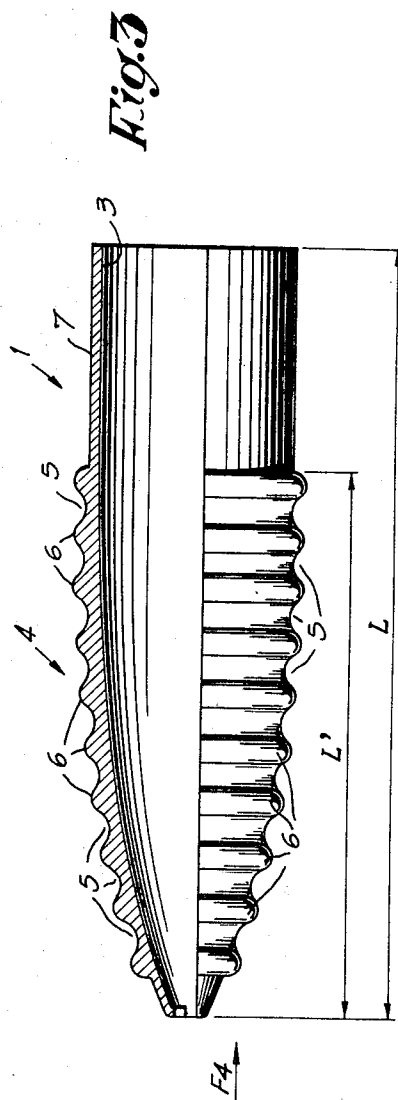
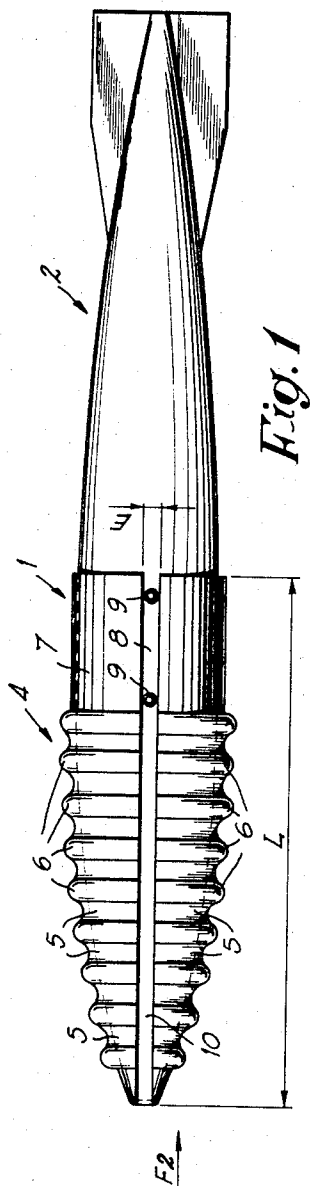
F. SCHROTH

3,434,417

Filed April 3, 1967

BOMB BRAKING SYSTEM

Sheet 1 of 4



INVENTOR.  
F. Schroth  
BY  
Richard & Geier  
ATTORNEYS

March 25, 1969

F. SCHROTH

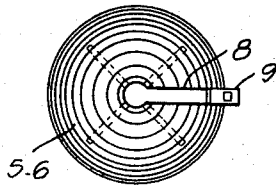
3,434,417

BOMB BRAKING SYSTEM

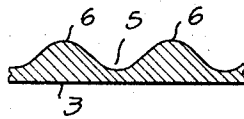
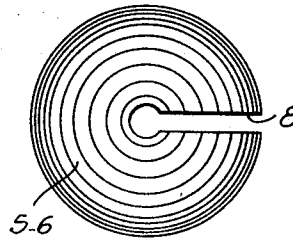
Filed April 3, 1967

Sheet 2 of 4

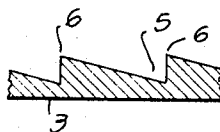
*Fig. 2*



*Fig. 4*



*Fig. 5*



*Fig. 6*



*Fig. 7*

INVENTOR.

*F. Schroth*

BY

*Richards & Geier*

ATTORNEYS

March 25, 1969

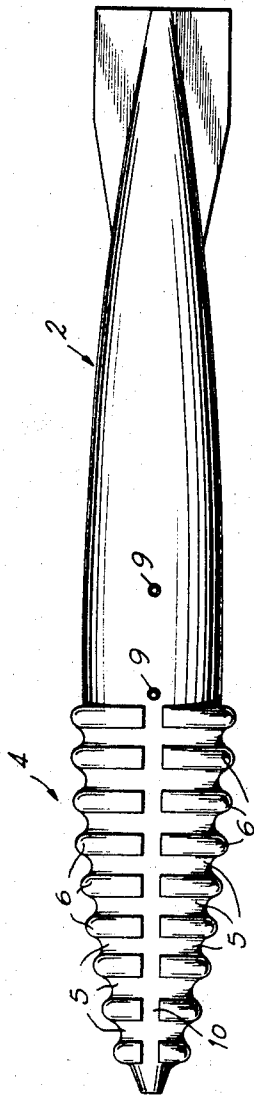
F. SCHROTH

3,434,417

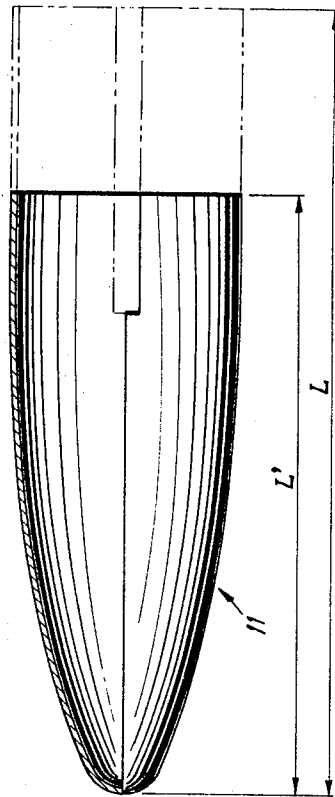
Filed April 3, 1967

BOMB BRAKING SYSTEM

Sheet 3 of 4



*Fig. 8*



*Fig. 9*

INVENTOR.  
*F. Schroth*  
BY  
*Richards & Geier*  
ATTORNEYS

March 25, 1969

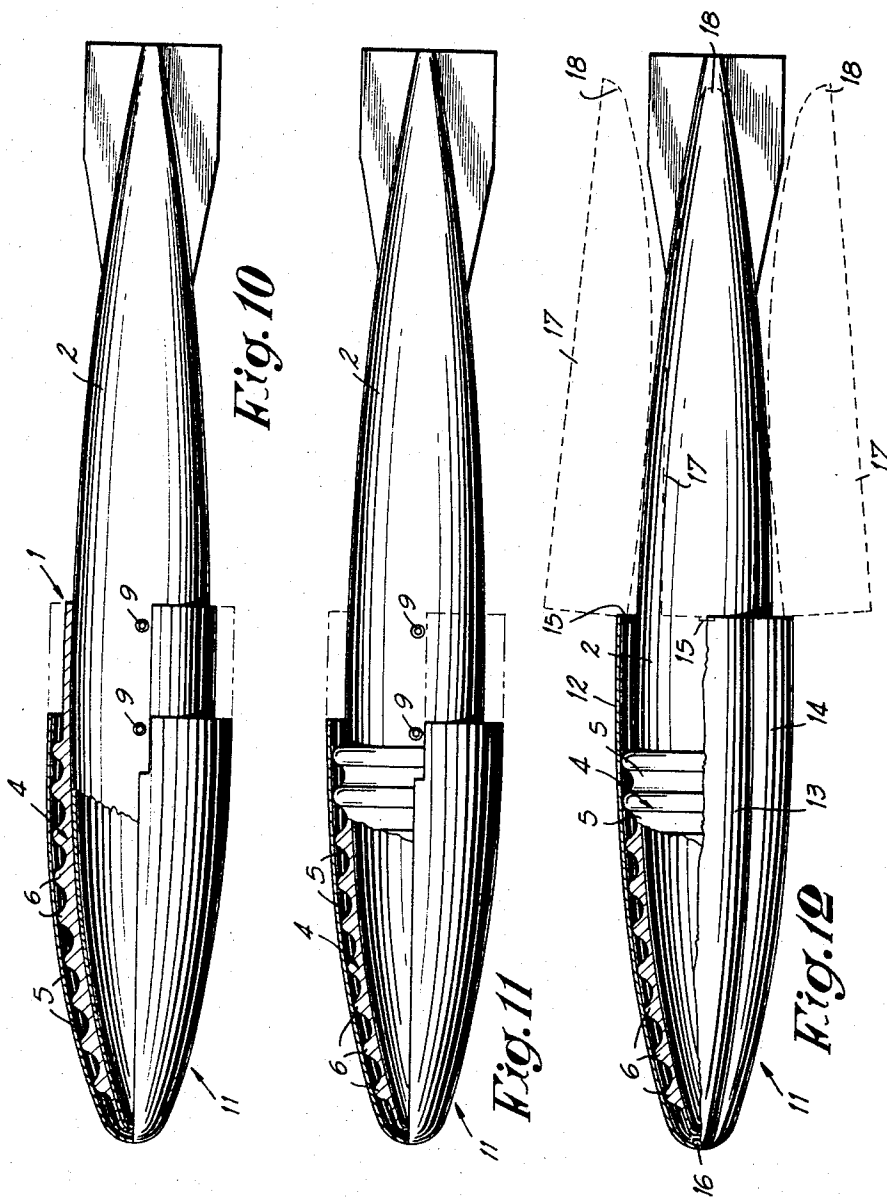
F. SCHROTH

3,434,417

BOMB BRAKING SYSTEM

Filed April 3, 1967

Sheet 4 of 4



INVENTOR.

F. Schroth

BY

Richards & Geier

ATTORNEYS

1

3,434,417

## BOMB BRAKING SYSTEM

Fridolin Schroth, Koblenz, Germany, assignor to Les Forges de Zeebrugge S.A., Herstal-lez-Liege, Belgium, a company

Filed Apr. 3, 1967, Ser. No. 628,072

Claims priority, application Germany, July 26, 1966, Sch 39,315; Dec. 24, 1966, Sch 40,023

Int. Cl. F42b 25/00

U.S. Cl. 102—4

4 Claims

### ABSTRACT OF THE DISCLOSURE

An air dropped missile has a nose provided with outer transverse corrugations and a nose-shaped cover adapted to momentarily cover these corrugations and having a smooth outer surface.

This invention relates to a system provided for braking a bomb released at low altitude and at high speed.

As is known, bombs are most efficiently released when flying in skimming the ground at high speed. This method has the advantage of little endangering the attacking plane since it is under radar reach of the enemy. The shooting accuracy realizable when attacking in skimming the ground is very high since the bombs may be released at a very small height above the target. In addition, the bombs may be so released even in disadvantageous atmospheric conditions. However, a normal unbraked bomb released in skimming the ground at high speed endangers the plane itself. So as not to endanger the plane by said bomb, the latter should be provided with a braking rocket. However, a braking rocket introduces at least the following drawbacks:

(1) In case of light structural targets, the bomb ricochets and is without any effect;

(2) In case of bulky structural targets, the bomb will break up by the high speed without having fulfilled its function.

Various relatively complicated systems have been designed, said systems being provided to allow releasing bombs in skimming the ground without endangering the plane and the crew thereof.

A first system brakes the bomb after releasing from the plane by means of a parachute provided at the rear of the bomb. In another system, the braking is provided by a combination of spacing traps and a parachute. Still in another system, the bomb is braked only with spacing traps.

These three braking systems are too complicated and subject to defects and, when suddenly opening the braking device, the impact is too high. In addition, a sudden braking of the bomb has a unfavorable influence upon the aiming accuracy.

This invention is based upon the new concept of a simple and flexible braking of the bomb.

For that purpose, the invention provides conditioning the bomb body on a longitudinal portion from the front end so as to present a not smooth or not continuous external surface, i.e. a surface having successive steps generally in the form of annular grooves. Generally, these grooves will be equally spaced and they may have an essentially variable cross-section in shape as well as in size, the latter being determined and selected in accordance with the desired braking effects as a function of the projectile type being equipped. This special braking surface may be provided either by the corresponding portion of the bomb body itself or by an inserted casing. The latter will be conditioned to be readily disposed upon the bomb without any tool and without any long or critical operation and without requiring any modification in the ex-

2

ternal characteristics of the bomb or its fastening or suspending means. For that purpose, along a generatrix and at least upon a longitudinal portion thereof from its larger diameter, the said casing will be provided with such a longitudinal cut-out that the said casing will be capable of substantially covering instantaneously the front portion of the bomb by avoiding the obstacle presented by the suspension rings thereof.

According to the invention, means are also provided to cancel the braking effects of the so conditioned bomb either when such braking is not required or before releasing. This means comprises covering the said unsmooth surface with a cap having a smooth external surface. Thus, according to the case, this cap will be disposed either directly upon the corresponding front portion of the projectile or concentrically upon the cap having an unsmooth external wall. In any case, the said cap having a smooth external wall will be conditioned to be either systematically separable from the projectile or spaced from the said unsmooth external surface of the said projectile when releasing or immediately thereafter. The unsmooth portion will be freed in this manner either by a connection between the said cap having a smooth external wall with a portion adjoining the plane or by separating the constituting portions of the said cap by means of an explosive charge provided or not provided with a retard- ing system or by any other means.

Thus, this invention concerns bombs, the external surface of which is not smooth upon a longitudinal portion from the front end, i.e. bombs having a braking surface, and any cap having an external braking surface conditioned to be secured on the front portion of a bomb, and complementary caps having a smooth external surface to be momentarily secured either directly on the bomb or on the cap covering the front portion of the bomb.

Only by way of example and without any restriction, embodiments will be described hereafter and represented in the enclosed drawings wherein:

FIGURE 1 shows a plan view of a bomb covered with a casing according to the invention;

FIGURE 2 is an end view according to the arrow F2 of FIGURE 1;

FIGURE 3 shows a half vertical section and a half longitudinal section of a casing according to the invention;

FIGURE 4 is an end view in the direction of arrow F4 of FIGURE 3;

FIGURES 5, 6 and 7 show, in cross-section and by way of example, three different profiles of annular grooves characterizing the casing according to the invention;

FIGURE 8 shows a plan view of a bomb, the front portion of which presents a braking surface;

FIGURE 9 shows a half plan view and a half longitudinal section of a complementary cap for momentarily cancelling the braking effects;

FIGURE 10 shows a partial plan view and a partial longitudinal section of the application of a cap according to FIGURE 9 on a bomb covered with a sleeve having an unsmooth surface according to FIGURE 1;

FIGURE 11 shows a partial plan view and a partial longitudinal section of the application of a cap according to FIGURE 9 on a bomb according to FIGURE 8; and

FIGURE 12 is a view similar to that of FIGURE 11 representing another embodiment for realizing and mounting the cap according to FIGURE 9.

As represented in FIGURES 1 to 4, a casing 1 according to the invention is generally made of a plastic material or any other suitable material under the form of a cap capable of correctly contouring the front portion of bomb 2 at least upon a predetermined length L. The internal face 3 of said cap will be generally smooth and, in any case, it will be determined in accordance with the cor-

responding portion of bomb 2, whereas the external surface 4 of said cap will present successive steps generally outlined by similar or different, equally spaced or differently spaced annular grooves 5 in accordance with the braking effect being produced.

According to FIGURES 1, 3 and 5, the said external surface 4 will be transversely corrugated so that the said annular grooves 5 and consequently also the annular ribs 6 separating them will be sinusoidally shaped. FIGURE 6 represents an ear shape and FIGURE 7 represents such ear shape slightly modified. Of course, any other suitable shape could be provided. This raised surface portion extends upon a length L' of the casing, said length being itself predetermined in accordance with the braking effects being produced. The rear portion 7 of casing 1 may be smooth, respectively continuous or cylindrical. Upon the whole length L or a portion thereof, the casing presents a longitudinal cut-out 8 the width E of which is equal or slightly larger than the diameter of the fastening or suspension rings 9 generally provided on bomb 2. Of course, this cut-out may be adjusted in accordance with the space occupied by the said fastening elements of the bomb so that the casing may be disposed upon the bomb without any tool nor any disassembling operation.

When applying such casing 1, the cross-section of the bomb is increased and due to this increase and the effect of the external profile of said casing, the friction resistance is substantially increased. Consequently, the falling time of the bomb after releasing is increased, which is sufficient to give a sufficient safety distance to the plane. By means of such casing forming a very simplified braking means, the same effects as those provided by using complex and expensive braking means are obtained.

This braking casing may be fitted to any bomb before loading and it may be secured to said suspension rings 9 of the bomb without any disassembling or mounting operation of any portion of the bomb.

According to the present invention, the guiding mechanism is kept integral with the bomb. In addition, due to the effect of the longitudinal cut-out 8 extending advantageously as a groove 10 up to the nose of the bomb, owing to the back pressure when releasing, the bomb has a tendency to nose-drive, thereby bringing it more rapidly and systematically in its vertical position for a normal fall.

Of course, the same braking effect may be obtained by making the bomb as represented by way of example in FIGURE 8, the front portion presenting a profile similar to the profile 4 of the sleeve described in the preceding example. The same successive parallel grooves 5 and torus-shaped ribs 6 are also provided therein.

Whatever the embodiment may be, provided that the braking effect is not required, the said unsmooth surfaces 4 may be advantageously covered with a cap 11 having a smooth external surface. This cap will be conditioned so that its shape and its internal dimensions allow an adjustment by leaning upon the outermost generatrices of said stepped ribs 6.

As described for the cap having an unsmooth external

surface, this complementary cap may have, a length L, L' or any other length consistent with the bomb type and the used separating means.

In one embodiment, this complementary cap 11 may be connected e.g. by at least a filiform element having a good resistance with an adjoining portion of the plane in such manner that, due to the effect of the speed differences immediately after releasing the bomb from the plane, the said cap with a smooth external wall is separated from the projectile. Alternately, the said cap having a smooth external wall could be arranged with shells being kept assembled by a means freed when releasing. A modification of this embodiment is represented in FIGURE 12 according to which the complementary cap 11 is provided in four sections three of which 12-13-14 are apparent, each section being hinged on the bomb body as indicated in 15. These four sections are kept in covering position by any suitable means such as weld spots which are broken by firing an explosive charge 16 under the action of the releasing mechanism of the bomb and preferably provided with a retarding device. After the explosion of charge 16, the said sections occupy the position indicated in dotted lines in FIGURE 12, a position in which they provide additional guiding surfaces 17 and complementary braking surfaces 18.

For any cap having a smooth or unsmooth external wall, there may be used any suitable material such as metal, pressed material, fibrous material, plastic material or a combination thereof.

What I claim is:

1. An air dropped missile comprising a body having a nose, at least a part of the outer surface of said nose having transverse corrugations, and a separate nose-shaped cover adapted to momentarily cover said corrugations and having a smooth outer surface.

2. A missile in accordance with claim 1, wherein said nose is a separate member secured to the forward end of said body.

3. A missile in accordance with claim 2, wherein said cover consists of a plurality of assembled parts.

4. A missile in accordance with claim 3, wherein the parts of said cover are pivoted to said body.

#### References Cited

##### UNITED STATES PATENTS

2,393,274	1/1946	Whitesell	102-2
3,002,453	10/1961	Fedor et al.	102-2
3,112,906	12/1963	Zeyher	102-4 X
3,185,035	5/1965	Gregory-Humphries	89-1.816 X
3,282,216	11/1966	Calfee et al.	102-105
3,298,312	1/1967	Adams	102-105

##### FOREIGN PATENTS

2,271	1895	Great Britain.
-------	------	----------------

SAMUEL W. ENGLE, *Primary Examiner*.

U.S. Cl. X.R.

244-3.27