

DESCRIPTION

Flare with flare ignition and ejector mechanism for the
5 same

The invention relates to a flare and to the capability for improved flare ignition, in particular to novel and rapid ignition of the coated films with active pyrotechnic substances for the production of a pyrotechnic signature with the aim of producing a camouflage screen etc., for the protection of vehicles and objects, for example aircraft against heat-seeking threats, for example surface-to-air rockets.

15 Pyrotechnic films with a pyrotechnic coating, for example red phosphorus, are used in various cartridges, in order to spontaneously cover a surface with hot particles in order, for example, to mask out a thermal
20 image. In this case, the carrier is broken up with the aid of a central fuse charge. During break up, a flame front and a pressure front are formed, which on the one hand distribute the pyrotechnic films over an area, and on the other hand produce a flame front, igniting the
25 pyrotechnic films.

At the moment, Class 1 break-up systems are used to produce these massive pyrotechnic effects. This results in a very high classification of the active system and prevents use for protection, for example, of civil aircraft, since it is forbidden to carry Class 1 substances/appliances in aircraft such as these.

The purpose for the invention in this context is to
35 specify a flare having a flare ignition which also
allows use for / in civil aircraft, vehicles, objects
etc.

- 2 -

The object is achieved by the features of patent claim 1, and further advantages are indicated in the dependent claims.

5 The invention is based on the idea of achieving the ignition contactlessly, for example by heat transfer. To this end, a specific temperature that is higher than the ignition temperature is produced and is transmitted to the films, such that they are ignited.

10

This is then carried out from the interior.

The solution principle is represented by a tubular connecting stub which can be heated to the specific
15 temperature and preferably tapers conically, by means of which the films with a pyrotechnic or comparable coating which can be ignited are ignited during axial relative movement. The coated films are ignited in the tubular connecting stub and are left while burning.

20

When the coated polygonal films move relatively in the heated tubular connecting stub, their corners slide along the connecting stub length and are ignited by the heat transfer produced in the corners that are in
25 contact with the tube or tubular connecting stub.

The tapering barrel is therefore one preferred embodiment to ensure ignition. The contact surface between the coated film and the (conical) tubular
30 connecting stub increases continuously during relative movement, and in consequence increases the functional reliability.

The heating of the (conical) tubular connecting stub
35 can be carried out both electrically and by a burner, etc.

- 3 -

The active signature starts without delay for ejection of the coated films, and enhances the effectiveness of the protection system.

5 The coated films preferably have a specific polygonal geometry. The functional reliability of the ignition is in this case increased in proportion to the number of corners of the coated films.

10 The coated films can be deployed individually and in layers in a pack, thus considerably enhancing the effectiveness of the protection system. Radial rotation of the coated film is irrelevant to the effectiveness itself.

15

The advantages of this system are not only the very high functional reliability with a low failure rate, but little maintenance effort, low costs and adequate safety for transport and when in operation. This is
20 achieved in that the coated films are accelerated in a separate acceleration system, which is at the same time decoupled from the heat, before the heated tube or tubular connecting stub. The coated films can be accelerated mechanically (for example by a spindle
25 drive), pneumatically (for example by compressed air) or else pyrotechnically.

The system is suitable not only for protection of civil aircraft but also for protection of vehicles,
30 buildings, moving and/or stationary objects of any type, and of marine vessels because of the characteristics of the flares which provide visual (smoke) and infrared concealment.

35 The invention will be explained in more detail using one exemplary embodiment and with reference to the drawing, in which:

- 4 -

Figure 1 shows a conically tapering tubular connecting stub as the basic unit for ignition,

5 Figure 2 shows a geometrically preferred illustration of a flare.

In Figure 1, 1 denotes a preferably conically tapering tubular connecting stub with a heating element of a
10 deployment system 2 (also referred to as an ejection system) for at least one flare 10 (figure 2). The tubular connecting stub 1 has a first, front internal diameter D_{IR-2} and a second, rear internal diameter D_{IR-1} , as well as a length L . The deployment system 2
15 furthermore comprises an acceleration unit 3 and insulation 4 in order to provide thermal decoupling between the ignition unit 1 and the acceleration unit 3. The second internal diameter D_{IR-2} is in this case equal to the diameter of the insulation 4 and of the
20 acceleration unit 3. P denotes the axial movement direction of the film and of the flare 10.

Figure 2 shows a polygonal, coated flare 10. The number of corners E should be greater than three. The diagonal
25 D_F between the corners E is in this case greater than the rear internal diameter D_{IR-1} . The first internal diameter D_{IR-2} is itself greater than or equal to the diagonals D_F . During relative movement - in the direction P - the corners E slide in the heated tube 1
30 along the length L and are ignited by the heat transfer that is produced in the corners E which are in contact with the tubular connecting stub 1. Subject to the condition mentioned above, the contact area between the coated film 10 and the correspondingly conical tubular
35 connecting stub 1 increases continuously during relative movement.

The described exemplary embodiment is one preferred embodiment. Alternatively, the heatable tubular

- 5 -

connecting stub may also have a constant internal diameter. Conditions can then be created which allow adequate ignition of the flare 10, which can be achieved for example by the configuration of the flare 5 10 such that it should then be considerably larger than the internal diameter of the tubular connecting stub, in order that the corners of the flare can thus also come into contact with the heatable inner wall of the tube. In order to ensure adequate ignition, the films 10 could, for example, have corners which can be bent over, via which the heat transfer then likewise takes place, when the film is accelerated along the inner wall of the tube or tubular connecting stub.

CLAIMS

1. An ejection system comprising:
 - (A) a flare ignition system comprising
 - i. a tubular connecting stub provided with one or more heating elements disposed to heat the tubular connecting stub, wherein the tubular connecting stub has a conically tapering shape, wherein contactless ignition of an ejectable flare occurs due to heat transfer from the tubular connecting stub to a pyrotechnic film of the flare when the tubular connecting stub is heated by the one or more heating elements and when the flare is disposed along an inner wall of the tubular connecting stub, wherein the flare is polygonal in shape and comprises corners, wherein the number of corners is greater than three, and the flare is coated with the pyrotechnic film, wherein when ignited, the flare produces a pyrotechnic signature suitable for producing a camouflage screen for the protection of vehicles and objects;
 - (B) an acceleration unit that is disposed adjacent to the tubular connecting stub of the flare ignition system; and
 - (C) a heat decoupling that is located between the acceleration unit and the tubular connecting stub.
2. The ejection system as claimed in claim 1, wherein the tubular connecting stub has a rear internal diameter (D_{IR-1}) and a front internal diameter (D_{IR-2}), wherein a diagonal (D_F) between corners of the flare is greater than the front internal diameter (D_{IR-2}) but is less than or equal to the rear internal diameter (D_{IR-1}) of the tubular connecting stub.
3. The ejection system as claimed in claim 2, wherein the flare is accelerated by the acceleration unit either mechanically, or pneumatically, or pyrotechnically.
4. The ejection system as claimed in claim 3, wherein the acceleration unit comprises a spindle drive, and the flare is mechanically accelerated by the spindle drive of the acceleration unit.
5. The ejection system as claimed in claim 3, wherein the acceleration unit comprises a pneumatic system, and the flare is pneumatically accelerated by the pneumatic system of the acceleration unit.
6. The ejection system as claimed in claim 1, wherein the flare is accelerated by the

acceleration unit either mechanically, or pneumatically, or pyrotechnically.

7. The ejection system as claimed in claim 6, wherein the acceleration unit comprises a spindle drive, and the flare is mechanically accelerated by the spindle drive of the acceleration unit.

8. The ejection system as claimed in claim 6, wherein the acceleration unit comprises a pneumatic system, and the flare is pneumatically accelerated by the pneumatic system of the acceleration unit.

9. The ejection system as claimed in claim 1, wherein the heat decoupling comprises insulation.

10. An ejection system comprising:

(A) a flare ignition system constructed to eject an ejectable flare that produces a pyrotechnic signature with the aim of producing a camouflage screen for the protection of vehicles and objects, wherein the flare is polygonal in shape and comprises corners, wherein the number of corners is greater than three, and the flare is coated with a pyrotechnic film, and wherein the flare ignition system comprises

i. a tubular connecting stub provided with one or more heating elements disposed to heat the tubular connecting stub, wherein the tubular connecting stub has a conically tapering shape, wherein contactless ignition of the flare occurs due to heat transfer from the tubular connecting stub to the pyrotechnic film of the flare when the tubular connecting stub is heated by the one or more heating elements and when the flare is disposed along an inner wall of the tubular connecting stub, and wherein the one or more heating elements are selected from the group consisting of electrical heating elements and a burner;

(B) an acceleration unit that is disposed adjacent to the tubular connecting stub of the flare ignition system; and

(C) a heat decoupling that is located between the acceleration unit and the tubular connecting stub.

11. The ejection system as claimed in claim 10, wherein the tubular connecting stub has a rear internal diameter (D_{IR-1}) and a front internal diameter (D_{IR-2}), wherein a diagonal (D_F) between corners of the flare is greater than the front internal diameter (D_{IR-2}) but is less than or equal to the rear internal diameter (D_{IR-1}) of the tubular connecting stub.

12. The ejection system as claimed in claim 11, wherein the flare is accelerated by the acceleration unit either mechanically, or pneumatically, or pyrotechnically.

13. The ejection system as claimed in claim 12, wherein the acceleration unit comprises a spindle drive, and the flare is mechanically accelerated by the spindle drive of the acceleration unit.

14. The ejection system as claimed in claim 12, wherein the acceleration unit comprises a pneumatic system, and the flare is pneumatically accelerated by the pneumatic system of the acceleration unit.

15. The ejection system as claimed in claim 10, wherein the flare is accelerated by the acceleration unit either mechanically, or pneumatically, or pyrotechnically.

16. The ejection system as claimed in claim 15, wherein the acceleration unit comprises a spindle drive, and the flare is mechanically accelerated by the spindle drive of the acceleration unit.

17. The ejection system as claimed in claim 15, wherein the acceleration unit comprises a pneumatic system, and the flare is pneumatically accelerated by the pneumatic system of the acceleration unit.

18. The ejection system as claimed in claim 10, wherein the heat decoupling comprises insulation.

19. An ejection system comprising:

(A) at least one ejectable flare, wherein the flare is polygonal in shape and includes corners, wherein the number of corners is greater than three, and the flare is coated with a pyrotechnic film;

(B) a flare ignition system comprising

i. a tubular connecting stub provided with one or more heating elements disposed to heat the tubular connecting stub, wherein the tubular connecting stub has a conically tapering shape, wherein contactless ignition of the ejectable flare occurs due to heat transfer from the tubular connecting stub to the pyrotechnic film of the flare when the tubular connecting stub is heated by the one or more heating elements and when the

flare is disposed along an inner wall of the tubular connecting stub, wherein when ignited, the flare produces a pyrotechnic signature suitable for producing a camouflage screen for the protection of vehicles and objects;

(C) an acceleration unit that is disposed adjacent to the tubular connecting stub of the flare ignition system; and

(D) a heat decoupling that is located between the acceleration unit and the tubular connecting stub, wherein the heat decoupling comprises insulation,

wherein the tubular connecting stub has a rear internal diameter (D_{IR-1}) and a front internal diameter (D_{IR-2}), wherein a diagonal (D_F) between corners of the flare is greater than the front internal diameter (D_{IR-2}) but is less than or equal to the rear internal diameter (D_{IR-1}) of the tubular connecting stub, and the one or more heating elements are selected from the group consisting of electrical heating element and a burner, and wherein the flare is accelerated by the acceleration unit either mechanically, or pneumatically, or pyrotechnically.