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GUIDE TUBE MAGAZINE FOR CARRYING AND LAUNCHING AIRPLANE ROCKET-BOMBS

Filed Nov. 17, 1964

2 Sheets-Sheet 1

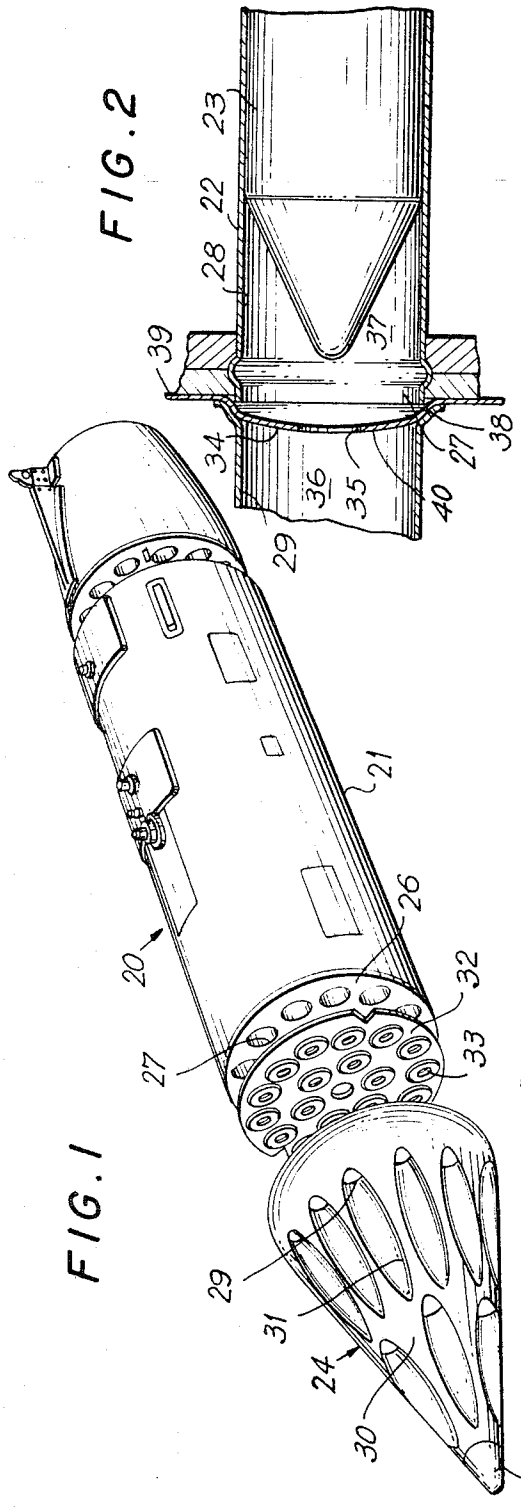


FIG. 1

FIG. 2

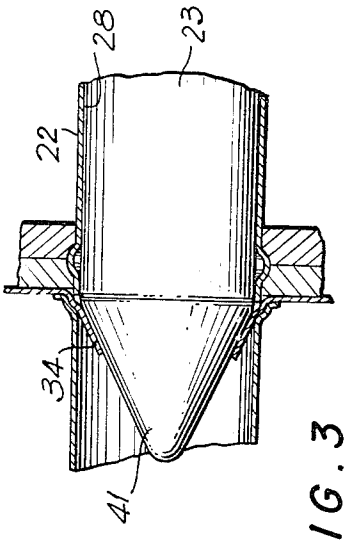


FIG. 3

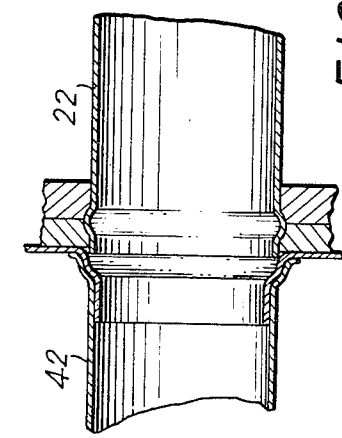
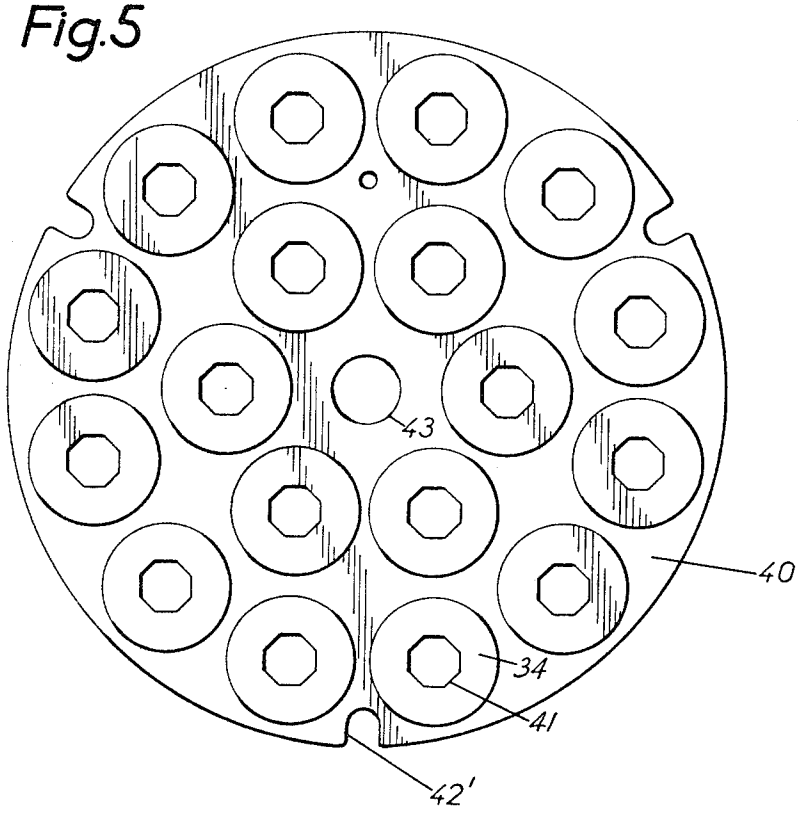


FIG. 4

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Fig.5



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GUIDE TUBE MAGAZINE FOR CARRYING AND LAUNCHING AIRPLANE ROCKET-BOMBS

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4 Claims. (Cl. 89—1.817)

The present invention relates to rocket-bomb carrying airplanes and, more particularly, to an arrangement of a guide-tube magazine for carrying and launching airplane rocket-bombs.

Fitting a high-speed airplane for carrying rocket-bombs raises many delicate and even unexpected problems.

Rocket-bombs are generally contained in tubes adapted to ensure the guidance thereof along the first portion of their trajectory, such tubes being assembled in a bunch or array located in a magazine arranged in the plane. It has been however established, for a long time, that in a tube-containing magazine of a fast-flying airplane, streamlined at the front where the guide tubes emerge, excessive heating is produced, during the high speeds of the plane, at the front end of the rocket-bomb, with the risk of a premature bursting of certain of the rocket-bombs.

In order to obviate such a drawback, it was proposed to seal, by means of plugs, the front end of the guide tubes, so as to avoid the admission of the air at a high speed into said tubes during the flight of the airplane, a plug being thereafter ejected by the rocket itself when launched.

While some satisfactory devices have been constructed and utilized, the opinion prevails among technicians that, at least for certain forms of plugs, the possibility is not entirely excluded that, under certain particular circumstances, a plug might offer an excessive resistance to its being ejected, resulting in possible serious damage, and also that during the arming procedure of a rocket-launching apparatus, the operator in charge is liable to forget to seal one of the tubes of the apparatus, which would cause the corresponding rocket to be subjected to the action of the air penetrating at a great speed.

The invention is intended to avoid, in a highly reliable manner, the bursting of a rocket-bomb contained in a guide-tube, without sealing the opening of the latter, but be only restricting the same peripherally by means of an annular diaphragm, transverse to the axis of the tube.

Experience has shown that, surprisingly, while there still exists a free pneumatic communication between the inside of the tube and the outside space, the temperature of the front end of the rocket-bomb remains at a substantially lower value than that which was previously found in tubes not provided with such a restriction.

The following analysis of this phenomenon, which does not appear to have been formulated up to the present, but of which no advantage was taken, provides an explanation of this fact.

When a guide-tube of a rocket-bomb emerges at the slanted surface of the stream-lined profile, there is produced in the tube, in front of the rocket head, a vortex motion of the air due to a dissymmetry in the distribution of the pressures at the outlet of the tube, such as dissymmetry occurring always when the axis of the tube forms an angle—different from zero—with the direction of the air stream. Such a phenomenon is similar to that occurring in the so-called "vortex-tube," wherein the vortex is produced by a jet perpendicular to the axis of the tube.

Now, many research works and tests have shown that in such a vortex motion, a thermal separation will take place between a peripheral flux of a high temperature and a central flux of a low temperature.

By placing, according to the invention, a peripheral annular diaphragm in front of each rocket-bomb, the hot air of the peripheral flux is unable to come in contact with the rocket-bomb; only comparatively cool air from the center is able to pass.

This explanation is confirmed by the fact that, in a magazine with no stream-lined profile, with the tubes thereof opening therefore onto a front face perpendicular to their axes, the temperature elevation of the front ends of the rocket-bombs is found to be much lower.

The annular diaphragm provided inside the tube is such that it does not offer any substantial resistance to the passage of the rocket-bomb at the instant of its launching.

According to the invention, the restriction peripheral rings or annular diaphragms are of a single piece which is adapted as a whole to the various guide-tubes of a magazine, so that the fitting of this single piece is sufficient to assure the improvement for all the guide tubes forming part of said magazine.

According to an embodiment, the central opening formed by the peripheral diaphragm is shaped as a polygon, thus facilitating at the passage of the rocket, the deformation of the diaphragm and reduces its resistance thereto.

The invention will be best understood from the following description and appended drawings, wherein:

FIGURE 1 is a general perspective view of an improved rocket-bomb magazine according to the invention, the various pieces of which are spaced apart for a better understanding of the drawing.

FIGURE 2 is a longitudinal cross-sectional view of part of a guide-tube for a rocket-bomb, comprising the restriction means according to the invention, in the position before the launching of the rocket-bomb.

FIGURE 3 is a view similar to that of FIGURE 2 at the instant of passage of the front portion of the launched rocket-bomb.

FIGURE 4 is a view similar to those in FIGURES 2 and 3, but after the passage of the rocket-bomb.

FIGURE 5 is a front view of the piece constituting the diaphragms of the various tubes.

The magazine **20** comprises a cylindrical body **21** containing a nest of guide tubes **22** for rocket-bombs **23**. The body **21** is extended, at the front portion thereof, by a stream-lined nose portion or cowl **24** of a conical, cylindroconical or ogival shape, tipped as at **25**. The tubes **22** emerge at the front wall **26** of body **21** along circular openings **27** the diameter of which is the same as that of the inner surface **28** of said tubes **22**. The nose **24** comprises channels **29** extending in corresponding relationship with the tubes **22**, the outlets of said channels at the external surface **30** of nose **24** being constituted by more or less elliptical elongated curves **31**.

In the illustrated embodiment described, there is inserted between body **21** and nose **24** a partition **32** presenting holes **33** of the same number and the same arrangement as openings **27**, but of a smaller diameter than the latter. When partition **32** is in position, there exists, in front of each one of the openings **27** of tube **22**, a peripheral ring or annulus member **34** formed with a central opening **35** of a smaller diameter than opening **27**; the insertion of said annular ring or diaphragm **34** between space **36** located in front of tube **22** and space **37** inside the latter, has proved of utmost importance for the non-heating of space **37** or, at least, for a substantially lesser degree of heating as compared to the case where there is a non-restricted communication between space **37** and channels **29**. Said ring or diaphragm **34** is of such material and/or of such shape that it offers little resistance to the passage of the rocket-bomb **23**. In the illustrated embodiment, each diaphragm **34** has a slightly curved contour, with a portion **38**, linked with the flat portion **39**

of the partition, forming a smaler angle with the axis of the tube than the main internal portion **40** of said diaphragm.

FIGURE 3 illustrates the deforming of diaphragm **34** under the action of tip **41** of the rocket-bomb **23**, and FIGURE 4 shows the condition of said diaphragm after the passage of the rocket-bomb, the various parts thereof being applied against wall **42** limiting channel **29**.

Partition **32** is simply made of a sheet of thin metal having a low mechanical resistance. Satisfactory results have been obtained, in the use of a magazine the guide tubes of which had an internal diameter of 70 mm., with diaphragms providing a central opening of a diameter of about 30 mm.

The invention provides for each diaphragm a central opening of a polygonal contour, for instance hexagonal or octagonal, facilitating in this way the breaking of the closure upon passage of the rocket-bomb. In FIGURE 5, there is shown a thin sheet piece **40**, in the shape of a disk, wherein eighteen annular diaphragms **34** have been stamped out for the protection of eighteen tubes of a rocket-bomb magazine, the inner edge **41** of each one of said diaphragm been cut out in the form of an octagon. Peripheral slots such as **42'** and a central opening **43** assure the positioning of piece **40** and cooperate with the same being secured between body **21** and nose **24**.

Whereas at the high subsonic speeds ($0.8<M<1$), the rocket-bombs of certain magazines get overheated and may reach temperatures up to 200° C., i.e. a multiple of the temperature at rest, the temperatures found on rocket-bombs contained in the improved magazine according to the invention did not exceed 50 to 60° C.

I claim:

1. In a guide-tube magazine for carrying and launching airplane rocket-bombs, comprising a magazine body, a tapered nose portion mounted on the forward end of said magazine body, a plurality of guide tubes mounted in said magazine body, said tapered nose portion having channels with outlets on the external surface of the tapered nose, said channels being longitudinal aligned with each of said guide tubes, a transversal partition inserted between

said body and said nose portion and formed with a plurality of openings coaxial, respectively, with said tubes and of a diameter smaller than the inner diameter thereof.

2. A magazine according to claim **1**, wherein said transversal partition comprises means for its angular positioning relative to said body and to said nose portion.

3. In a guide-tube magazine for carrying and launching airplane rocket-bombs, comprising a magazine body, a tapered nose portion mounted on the forward end of said magazine body, a plurality of guide tubes mounted in said magazine body, said tapered nose portion having channels with outlets on the external surface of the tapered nose, said channels being longitudinally aligned with each of said guide tubes, an annular wall in each tube secured to the latter along its outer edge, said annular wall being positioned in the tube forwardly of the rocket-bomb located therein and spaced from the forward end of the rocket-bomb, said wall having a central opening smaller in diameter than that of the tube, and being operative to restrict heating of the rocket-bomb due to penetration of air at high speed within the channels of the tapered nose portion, said annular wall being deformable upon passage therethrough of the corresponding rocket-bomb in the tube.

4. In a magazine as claimed in claim **3** wherein said annular wall has a domed shape with its convex side facing forwardly.

References Cited

UNITED STATES PATENTS

245,363	8/1881	Ericsson	89—31
3,137,231	6/1964	Johnson	102—34.4
3,199,406	8/1965	Gould	89—1.7

FOREIGN PATENTS

1,196,091	5/1959	France.
972,555	10/1964	Great Britain.

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