March 12, 1957 R. APOTHÉLOZ ET AL 2,784,669

ROCKET PROJECTILE WITH STABILIZER FINS

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Fig. 1

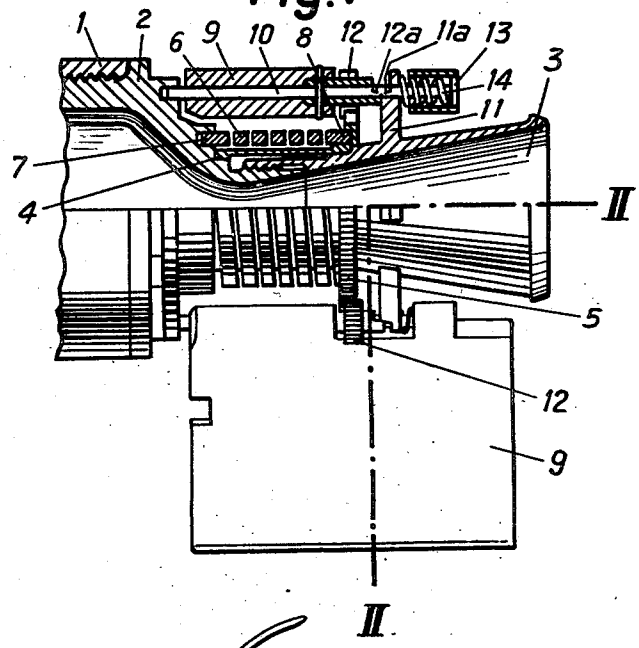
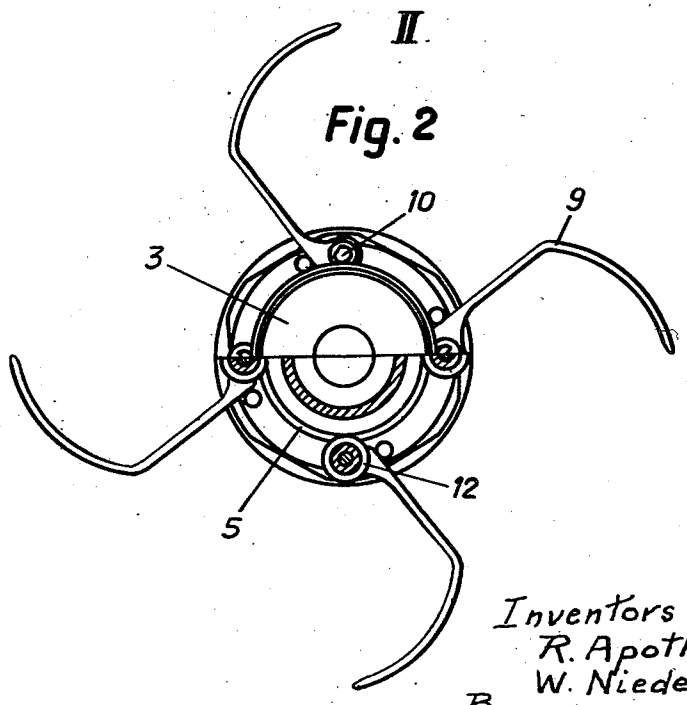


Fig. 2



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ROCKET PROJECTILE WITH STABILIZER FINS

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2 Claims. (Cl. 102—50)

The invention relates to a rocket projectile having stabilizer fins hinged at its rear end which are folded within the outline of the projectile for storage and transport, and are unfolded after launching the projectile in order to stabilize the same in flight.

It is the main object of the present invention to provide a rocket projectile of the kind referred to in which the said fins are unfolded rapidly immediately after the launching of the projectile, in order to exert a stabilizing action without a delay which would be harmful to the accuracy of the trajectory of the projectile.

It is another object of the invention to provide a rocket projectile of the kind referred to in which all of the said fins are unfolded simultaneously in order to prevent deflection of the projectile owing to asymmetrical air drag which would occur if the said fins unfolded one after the other.

It is yet another object of the invention to provide a rocket projectile of the kind referred to wherein the said fins are automatically locked in their unfolded position immediately after having reached the same.

With these and other objects in view, I provide a rocket projectile of the kind referred to comprising in combination: a rear portion, retractable fins pivoted on the said rear portion parallel to the axis of the projectile, a coupling member and a coiled spring both arranged concentrically around the said rear portion and both being common to all of the said fins, the said spring being in torque connection with the said rear portion at one end and with the said coupling member at the other end, and after launching unfolding all the said fins simultaneously.

Preferably the said rocket projectile comprises a rear throat portion, a helical spring coiled round and at one end attached to the said throat portion, a toothed crown journalled on the outside of the said rear throat portion, and connected to the other end of the said helical spring, pivots arranged parallel to the projectile axis and rotatably journalled in the said rear throat portion, gear pinions and fins fixed for rotation on each of the said pivots, respectively, the said gear pinions meshing with the said toothed crown, which when rotated by the said helical spring expanding about the projectile axis after launching rotates the said pivots about their respective axes and thereby simultaneously unfolds the said fins.

In order to retain the said fins in their unfolded position, the said rocket may comprise in addition: a flange arranged on the said rear throat portion forming a bearing block for all the said pivots, a collar arranged on each of the said pivots behind said flange, a compression spring arranged on each of the said pivots between said flange and the said collar biassing the said pivot rearward in the axial direction, a cam arranged on each pivot and an associated cam on the said flange, the said cams and associated cams interengaging in the unfolded position of the said fins.

These and other objects and features of my said invention will be clearly understood from the following description of an embodiment thereof given by way of

example with reference to the accompanying drawing, in which:

Fig. 1 shows the rear portion of a rocket projectile, namely in the upper half a longitudinal section through the folded empennage, and in the lower half an elevation of the unfolded empennage.

Fig. 2 shows in the lower half a section along the line 2—2 of Fig. 1, and in the upper half a rear end view of the rocket with the empennage unfolded.

On the rear part of the rocket body **1** (Fig. 1) a nozzle **2** is arranged, on which a flaring extension piece **3**, is mounted. Around the throat section of the nozzle a cylindrical bush **4** with a toothed crown **5** is journalled rotatably. Around the bush **4** a helical torsion spring **6** is mounted which at one end is held in a recess **7** of the nozzle **2**, while its other end engages into a bore **8** of the toothed crown **5**. Each stabilizer fin **9** is mounted on a pivot **10** which is rotatably journalled in a bearing block **11** of the extension piece **3**. On the pivot **10** moreover a gear pinion **12** is mounted which is in mesh with the toothed crown **5**.

The pivot **10**, gear pinion **12** and stabilizer fin **9** are fixedly connected with one another, for example by means of a dowel pin. The pivot **10** carries at its rear end a flange **13**. Between the latter and the bearing block **11** a prestressed compression spring **14** is arranged which constantly pulls the pivot, and with it the gear pinion **12** and the stabiliser fin, in the rearward direction. The gear pinion and the bearing block have recesses **11***a* and **12***a*, respectively, which mutually interengage when the stabiliser fin is completely unfolded, and which secure the latter, as illustrated in the lower half of Fig. 1, in the unfolded position.

The manner of operation of the device is as follows: During storage and transport the stabiliser fins **9**, which are under the action of the pre-loaded helical torsion spring **6**, are held in their folded position by means of cap (not shown in the drawing). When pushing the projectile into the launching tube, the cap is removed, and the stabiliser fins bear on the inner wall surface of the launching tube. When the projectile has left the launching tube after firing, the stabiliser fins **9** are simultaneously unfolded about the pivots **10** by the helical torsion spring **6** which acts on the gear pinions **12** through the toothed crown **5**. Under the action of the compression spring **13** the two recesses **11***a* and **12***a* thereafter mutually interengage, and retain the stabiliser fins **9** in the unfolded position.

While I have herein described and illustrated in the accompanying drawing what may be considered a typical and particularly useful embodiment of my said invention, I wish it to be understood that I do not limit myself to the particular details and dimensions described and illustrated, for obvious modifications will occur to a person skilled in the art.

What I claim as my invention and desire to secure by Letters Patent, is:

1. A rocket projectile comprising in combination: a rear throat portion, a helical spring coiled round and at one end attached to the said throat portion, a toothed crown journalled on the outside of the said rear throat portion, and connected to the other end of the said helical spring, pivots arranged parallel to the projectile axis and rotatably journalled in the said rear throat portion, gear pinions and fins fixed for rotation on each of the said pivots, respectively, the said gear pinions meshing with the said toothed crown, which when rotated by the said helical spring expanding about the projectile axis after launching rotates the said pivots about their respective axes and thereby simultaneously unfolds the said fins.

2. A rocket projectile as claimed in claim 1, comprising in addition: a flange arranged on the said rear throat

portion forming a bearing block for all the said pivots, a collar arranged on each of the said pivots behind said flange, a compression spring arranged on each of the said pivots between said flange and the said collar biassing the said pivot rearward in the axial direction, a cam arranged on each pivot and an associated cam on the said flange, the said cams and associated cams interengaging

in the unfolded position of the said fins and being retained interengaged by the said compression springs.

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