April 24, 1945. B. A. AMES 2,374,261

PROPELLER SNARE

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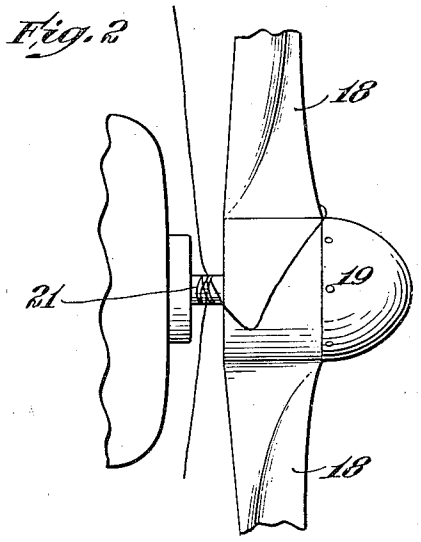

Fig. 2

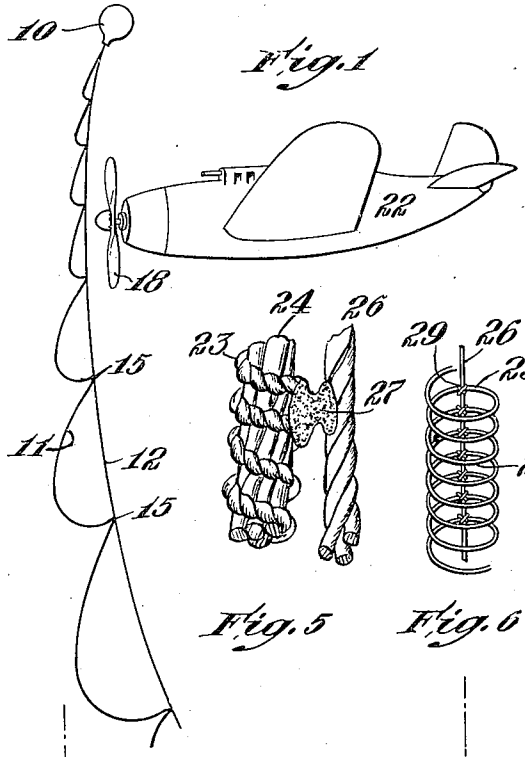

Fig. 1

Fig. 5

Fig. 6

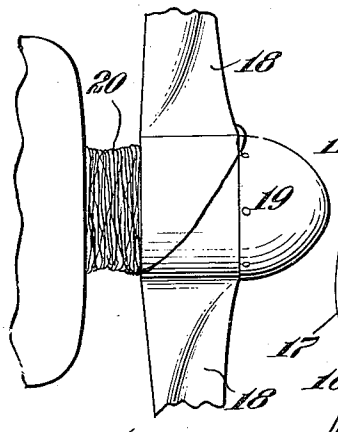

Fig. 3

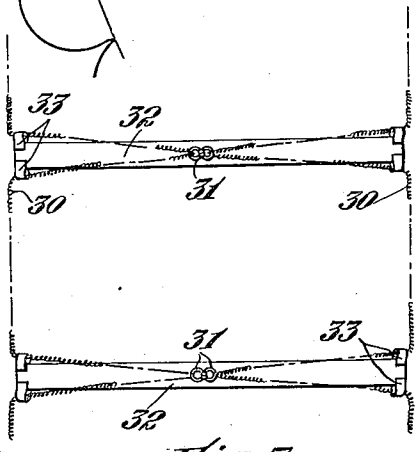

Fig. 7

Fig. 9

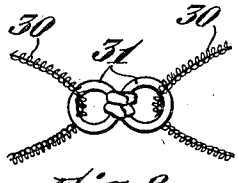

Fig. 8

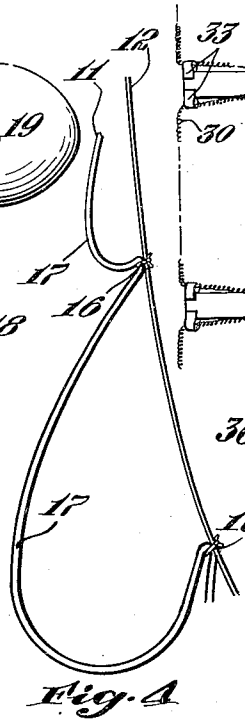

Fig. 4

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PROPELLER SNARE

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2 Claims. (Cl. 89—1)

This invention relates to propeller snares by which hostile airplanes in flight may be destroyed or brought down.

Snares for the purpose of stopping airplanes have heretofore been proposed consisting of wires, cables or similar strands suspended in the air, with the object of becoming entangled with or injuring the propeller or other parts of an airplane which may encounter them. Such straight strands are comparatively taut since they are held under considerable tension by their own weight and possess the inertia of their whole mass and therefore they do not yield readily to a sharp blow from a rapidly revolving propeller.

The principal object of the present invention is to provide snares of this general class in which the strands are so suspended that they will present to an airplane propeller lengths of strand sufficiently slack and free from tension and intertia to yield readily to the blow of a propeller without being cut or broken, whereby the strand will be caught by and ensnare the revolving propeller blades and become wound around the propeller shaft. The strand mass thus wound on the propeller shaft acts as a brake which stalls the engine and prevents restarting. If the strand is of inflammable material or treated with an inflammable material, the wound mass may be ignited by friction and cause damage by overheating the propeller shaft. The strand may also carry explosive material, which after being wound into a sufficient mass around the propeller shaft and being exploded by heat will injure the bearings, lubrication system or other surrounding parts. And further the strand may also carry abrasive materials damaging to the propeller shaft, and if an explosive material is also used the explosion will blow abrasives into the neighboring parts.

More specifically, a snare embodying this invention comprises a braking strand of string, cord, rope or slender wire formed into a series of slack lengths which in effect float freely in the air substantially without tension. Such slack lengths may be formed and supported in many ways. For example, the slack lengths of the main or braking strand may be supported in the form of loops or coils from a second or supporting strand to which the main strand may be attached by string or elastic threads or adhesive strands or clips or knotting or any other suitable means at a number of spaced intervals so that the lengths of the braking strand between the points of attachment to the supporting strand form the desired loops or coils. Or, two or more braking strands may be connected together at intervals by rings or in other suitable ways, and the lengths between such points of connection may be spread and held in the form of loops by spanners of light, frangible material. Or, the braking strand may be in the form of a coil helically wound around a supporting strand or around a core containing a supporting strand.

Certain embodiments of the invention are illustrated in the accompanying drawing in which:

Fig. 1 shows an airplane approaching a snare embodying one form of the invention;

Fig. 2 shows a loop of the braking strand caught by the blade of a propeller of an airplane and drawn down to the hub thereof;

Fig. 3 shows a braking strand wound in a coiled mass around the shaft of the airplane propeller;

Fig. 4 shows on an enlarged scale a portion of a snare of the form illustrated in Fig. 1;

Figs. 5, 6, 7 and 9 show parts of other embodiments of the invention; and

Fig. 8 is an enlarged view of a detail of the embodiment shown in Fig. 7.

The snare embodying this invention may be suspended in the air from a balloon, parachute, kite or the like, or from supporting cables stretched generally horizontally to form a barrier or a network. In any case, the snare is preferably attached to the balloon or other support by a frangible connection which will break when the snare is caught by a propeller, as described below.

The snare shown in Figs. 1 and 4 includes a balloon 10 from which the snare is suspended. The snare consists of a braking strand 11 of string, cord, rope or light wire, and a supporting strand 12 of any suitable material. The strand 11 is attached to the strand 12 at spaced intervals 15 by ties or fasteners 16. The lengths of the strand 11 between the points 15 are substantially longer than the spacing of the points 15 on the supporting strand and thus form slack loops 17 which float or hang freely without substantial tension in the air. It is recommended that the slack loops 17 be made at least three times as long as the corresponding lengths of the supporting strand between the points 15.

When a blade 18 of a rapidly revolving propeller 19 encounters the snare, it will usually cut or break the supporting strand 12, but the main or braking strand made of slack loops 17 will yield sufficiently to avoid being cut, will be drawn down to the hub of the propeller and will be wound into a dense coil 20 around the propeller shaft 21. As the coil increases in size, the wound mass will brake the motor and stall it or slow it down ma-

terially so that the plane 22 will lose headway and crash.

In the embodiment shown in Fig. 5, the braking strand 23 is coiled around a core 24 made up of a plurality of chemically treated strands bearing explosives and abrasives. The strand 23 is attached to a supporting strand 26 at a plurality of points by suitable means such as a body of elastic adhesive 27.

Fig. 6 shows a braking strand 25 helically coiled to form a series of coils or loops 28 which are attached to a supporting strand 26 by suitable fastening means 29. These coils or loops, like the loops 17 of the embodiment first described, float freely in the air without substantial tension and upon being caught by the propeller of an airplane will be drawn toward the hub and wound about the propeller shaft as before.

Figs. 7 and 8 illustrate an embodiment of the invention which includes two braking strands 30 connected to each other at intervals, preferably by some form of tie which in effect forms a slip noose. As herein shown such attaching means consists of a double ring 31 best shown in Fig. 8, one strand passing through one ring and the other strand passing through the other ring. The two strands 30 are spread or separated into loops between the points of connection at the rings by spanners or spreaders 32 made of light, frangible material and having rings 33 which guide the strands at the ends of the spanners. When a propeller blade strikes a snare of this form, the relatively weak spanners will collapse, thus permitting the unsupported loops of the strands to yield without being cut or broken and the two strands will then be drawn by the revolving propeller toward the hub and then wound around the propeller shaft. More than two strands may be used if desired to insure that if one should be broken there are others which will be pulled in upon the propeller shaft.

Fig. 9 shows the braking strand 35 in the form of a helical coil wound around a core. The core may be merely a supporting strand, but preferably, and as shown in the drawing, it is a composite structure including a supporting strand 37 enclosed in a paper cover 36 which may be made of a paper ribbon or strip rolled lengthwise in the form of a paper tube around the supporting strand or helically twisted or wrapped in the form of a paper tube around the supporting strand. The braking strand may be wound on the core in an open coil as illustrated or in a closed coil. A greater length of slack braking strand for any given section of the snare is provided by a closed coil. When the core is ruptured by a propeller blade and the braking strand is caught by the propeller the coils of the braking strand quickly pay out endwise from the core for a considerable length and then tighten on the core so that the whole snare (coil and core) is ready to be wound on the propeller shaft and quickly to build up a large mass of material on the propeller shaft. The paper tube 36 may also serve as a wrapper to enclose inflammable or explosive or abrasive materials, or any combination of them, and it is advisable to make the tube of oiled or otherwise waterproofed paper in order to keep said materials dry and also to preserve the slipperiness of the paper tube itself and so facilitate the pulling of the coils off the core. A snare of the kind shown in Fig. 9 is complete in itself and may be used alone or it may be supported by a second supporting strand in any desired manner, for example, as shown in Figs. 1, 5 or 6.

In view of variable conditions, and in order to insure against failure, any of the forms of snares may be made with a multiplicity of braking strands so that if one be broken another will act to brake the motor. Furthermore, streamers may be attached to the braking strands at spaced points to increase the thickness of the wound mass around the shaft more quickly.

As suggested above, the braking strands may be treated with suitable inflammable or explosive or abrasive materials or be wound in spirals around a core of cotton so treated (Fig. 5). The inflammable and explosive materials may be of any well-known pyrotechnic composition, such as those having a red phosphorus-potassium chlorate base, or the like, and the abrasive material may comprise emery, carborundum, high carbon steel, etc., in granular form. Such materials will be rendered active by the heat generated by friction at the point where the strand mass is forced by the propeller shaft against the front plate of the engine.

The amount of slack most advantageously provided in the braking strands depends upon the conditions to be met, such as the length of the propeller blades, thickness of the propeller hub, speed of rotation, and the speed of travel. When the propeller blade strikes a loop or coil the supporting strands will break so there will be no delay in supplying enough braking strand to form an efficient mass to be wound on the propeller shaft. The movement of the braking strand along the blade to the hub usually takes place during one-third to one-half of a revolution, depending on the speed of the propeller and slipperiness of the blade and strand. In order to yield to the blow of the propeller enough slack strand must be immediately available to prevent severing the strand. Furthermore, the strand must be long enough to form a complete brake when wound up on the propeller shaft. The length of the strands and the amount of the slack may thus be varied to suit the conditions most likely to be encountered.

While the invention has been described as applicable for defense against airplanes, it is not limited thereto and might be used against other propeller impelled instrumentalities or revolving shafts such as submarines, torpedoes and the like.

I claim:

1. A propeller snare comprising a supporting strand, an ensnaring strand, and a core around which said ensnaring strand is coiled, said ensnaring strand and core being connected at intervals to said supporting strand to form a series of slack lengths or loops substantially free from tension.

2. A propeller snare comprising a supporting strand, an ensnaring strand, and breakable means connecting said ensnaring strand to said supporting strand at intervals to form a series of slack loops substantially free from tension, the lengths of said loops being several times as long as the corresponding lengths of the supporting strand between the breakable connecting means.

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