Jan. 10, 1967 O. OLSSON ET AL 3,296,927

GUIDED MISSILE

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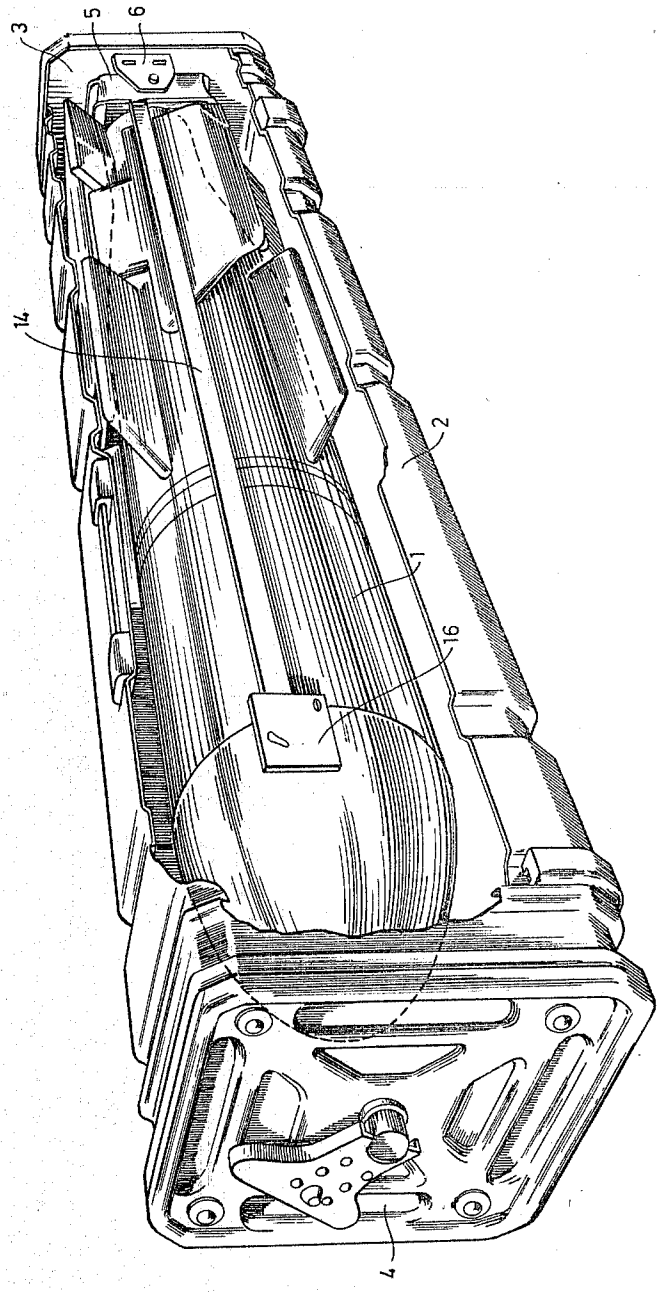

Fig. 1

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Fig. 3

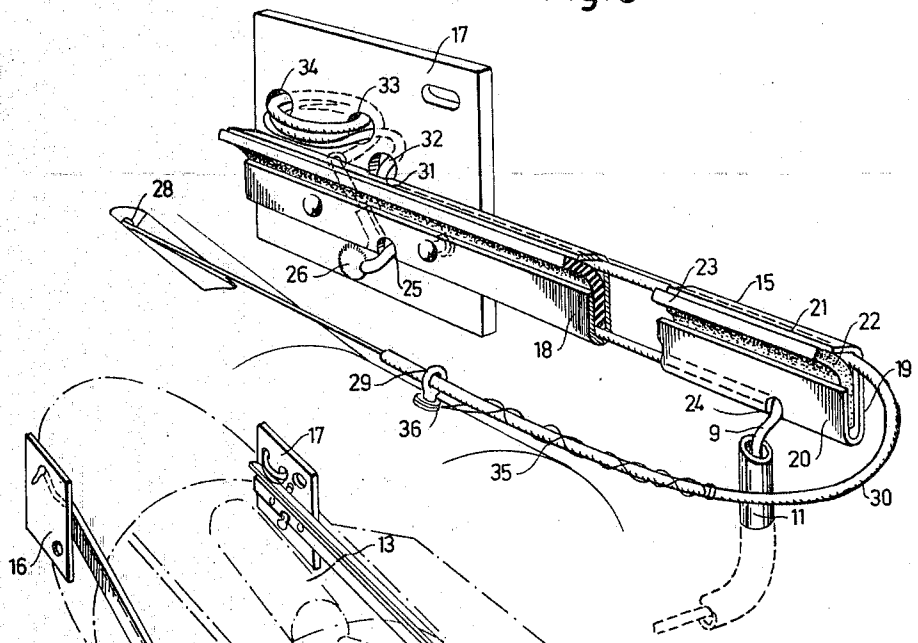
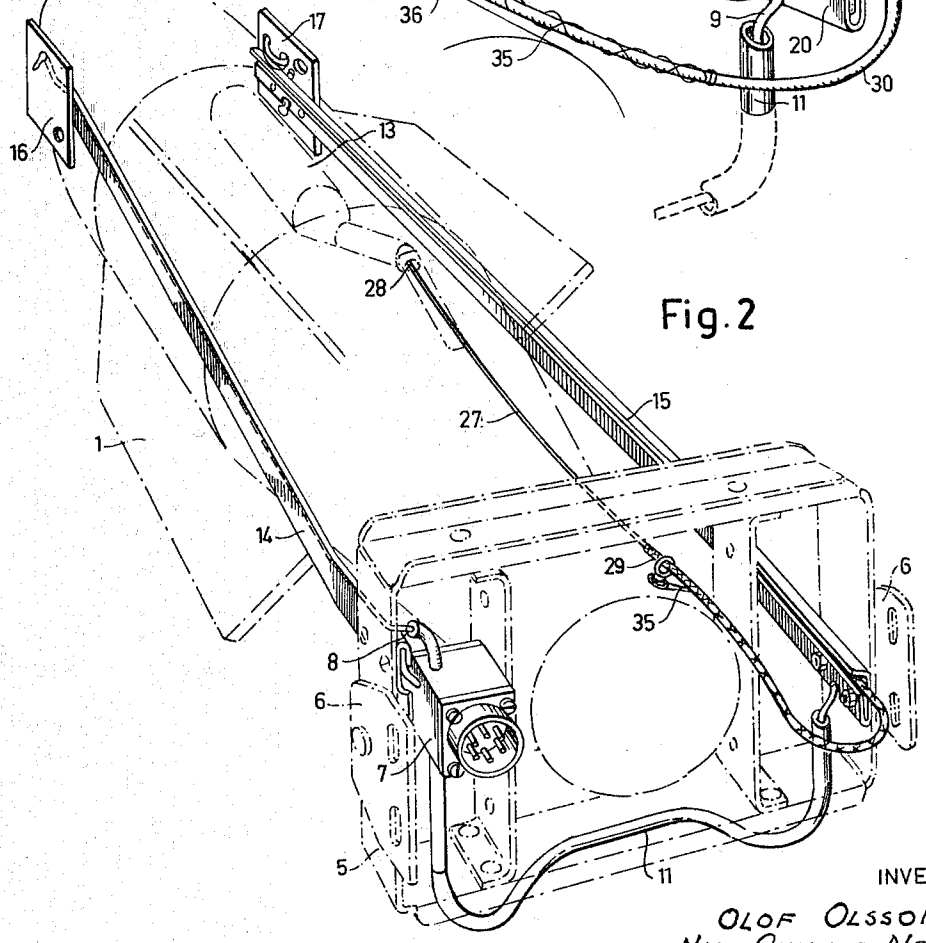


Fig. 2



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GUIDED MISSILE

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7 Claims. (Cl. 89—1.8)

The present invention relates to rocket-type missiles which are launched from a stationary, usually ground-based launching barrel which may be so designed that it can double as a transport and storage container. More particularly, the invention relates to a guided rocket-type missile which is connected to a stationary, usually ground-based transmitter by one or several wire conductors. The wire conductors serve to transmit control signals from the transmitter to a suitable receiver on the missile to effect continuous guidance of the missile toward the target. The conductor wires are initially stored in one or several magazines on the missile and are gradually withdrawn from the magazines when and while the missile is airborne. Missile guidance systems of this kind are well known in the art. They do not constitute part of the invention and are hence not described or illustrated in detail.

One of the problems with such guidance systems as heretofore known is that the conductor wires are exposed to the blast of the rocket gases emanating from the exhaust nozzle of the missile at the end thereof when the missile motor is started. These gases flow out through the respective open end of the container constituting the launching barrel and thus impact upon the conductor wires until the missile is clear of the launching barrel. The wires used in the guidance systems afore-referred to are generally very fine wires for reasons of weight and flexibility, the wire diameters being usually in the order of 0.1 mm. Such fine wires tend to be torn off which, of course, prevents guidance of a missile in flight.

It is a broad object of the invention to provide a novel and improved device protecting the portions of the conductor wires which tend to be exposed to the blast of the exhaust gases when the missile is launched, thereby preventing breaking of the wires during the critical starting period.

A more specific object of the invention is to provide a novel and improved device in which the wire portions tending to be exposed to the blast of the gases during the starting period are protected by a cover capable of withstanding the impact of the hot gases without appreciably interfering with the required low weight and high flexibility of the wires.

Other objects, features and advantages of the invention will be pointed out hereinafter and will be set forth in the appended claims constituting part of the application.

In the accompanying drawing a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a perspective view, partly broken open, of a missile and the launching container therefor equipped with a wire-guiding device according to the invention,

FIG. 2 is a perspective, skeletonized view of the wire guiding device and of the parts of the container and the missile directly coacting with the device, the respective container and missile parts being shown in phantom, and

FIG. 3 is a perspective detail view of FIG. 2 on an enlarged scale.

Referring now to thet figures in detail, there is shown a rocket-type missile **1** of conventional design having a

gas exhaust nozzle at one end. The missile motor is not illustrated or described since it does not constitute part of the invention. It is sufficient to visualize that a jet blast of gases will emanate from the nozzle of the missile when the missile motor is started. The missile is shown as being placed in an elongated box or container **2** which serves both as a storage and transport container for the missile and as a launching barrel in a manner which is not essential for the understanding of the invention, but is well known in the art. The launching box has a rear cover **3** and a front cover **4** which are removed when the missile is reduced for launching. A frame **5** is secured to the rear end of box **2** by any suitable means such as bracket **6**. The frame supports a connector **7** which should be visualized as being suitably connected to a ground-based control transmitter which is not illustrated and should be visualized as being conventional. Conductors **8** and **9** which are at least partly protected by insulation sleeves **10** and **11** respectively, extend from connector **7** as part of the circuit connections between the control transmitter on the ground and a suitable and conventional receiver (not shown) on the missile. The circuit connections from the receiver to ground are completed by one or several conductor wires **27**. These wires are initially wound up in suitable magazines **13** on the missile, one of the magazines being shown in FIG. 2. As the missile becomes airborne, the wires **27** are gradually withdrawn from the magazines so that the missile remains in continuous mechanical and electrical connection with the control transmitter.

Frame **5** mounts two substantially rigid bars **14** and **15** which extend along two opposite walls of the box toward its forward end. Insulation plates **16** and **17** respectively are secured to the ends of bars **14** and **15** opposite to frame **5**. To simplify the illustration, the guiding device for only one of the wires **27** is shown in detail, but it should be understood that the guiding device for each of the conductor wires is substantially the same.

As can best be seen in FIG. 3, each of the bars forms a substantially U-channeled strip **18**. The branch or shank **19** of the strip terminates in an inwardly turned flange **21** which faces toward the interior of box **2**. A strip **22** of soft cushioning material, such as foam rubber or other soft rubber, is inserted into the channel of U-strip **18** and is secured along its inner longitudinal edge, for instance by clamping the cushion strip between branches **19** and **20** of strip **18**. The width of the cushion strip is such that the strip is forced outwardly by flange **21** to form a lip **23**, as is clearly shown in the figure.

Conductor wire **9** extending from connector **7** is passed through a hole **24** near the rear end of branch **20** of strip **18** and runs along the bight of the strip below the lower edge of cushion strip **22** to a hole **25** near the forward end of bar **15**. The end of wire **9** is pulled out through a hole **25** near the front end of bar **15** and soldered to plate **17** at **26**. Conductor wire **27** extending from magazine **13** is also soldered to solder point **26**, as will be more fully described hereinafter, so that there is electrical connection between wire **27** and connector **7**, and thus between the receiver on the missile and the transmitter on the ground.

Wire **27** is extended through an outlet **28** of magazine **13** and a wire guide such as an eye **29** secured on the magazine body near the exhaust end thereof. The portion of wire **27** extending from about eye **29** to solder point **26** is loosely encompassed by an insulation tube **30** made of a material capable of withstanding the blast action of the exhaust gases at least for a limited period. A suitable material has been found to be a plastic known under the tradename "Systoflex." However, many other materials are known and readily available in the market. As it is readily evident from FIGS. 2 and 3, the portion of the

wire encompassed by tube 30 is the one which will be exposed to the blast of the bases when the missile is launched.

As shown in FIG. 3, a major portion of tube 30 is initially fitted into the gap defined by rigid flange 21 and soft lip 23 whereby this sleeve portion is frictionally retained by the elasticity of the lip. The retained portion of sleeve 30 extends from the rear end of bar 15 to a point close to the forward end of the bar where it is guided through a hole 31 in flange 21 and through an aligned hole 32 in insulation plate 17. It is then passed a few times through holes 33 and 34 in plate 17 to form several loops before wire 27 in sleeve 30 is joined to conductor wire 9 at solder point 26, as previously described. As it is evident, the loops of sleeve 30 constitute in effect a strain relief for the solder connection of wire 27 at 26.

The wire guiding device of the invention further comprises frangible holding means shown in the form of a thin metal wire 35 which is secured at one end to the missile body, for instance by means of a second eye 36 near eye 29. Wire 35 is tightly wound a number of times about the portion of sleeve 30 extending between eye 29 and the rear end of bar 15 whereby wire 35 impedes sliding of sleeve 30 and the wire 27 therein through eye 29 for a purpose which will be more fully described hereinafter.

The operation of the missile launching installation as hereinbefore described is as follows:

Let is be assumed that all the components are in the positions shown in FIGS. 2 and 3 and that it is now intended to launch the missile.

As it is evident from the previous description, a length of wire 27 with its insulation sleeve 30 is held in bar 15 by the frictional grip between flange 21 and lip 23 and it is also restrained on the missile by wire 35. The tensile strength of this wire is so selected that it is higher than the strength of the frictional grip by which sleeve 30 is held in bar 15. When the missile begins to move in box 2, sleeve 30 and the wire 27 therein will be gradually pulled out of bar 15 starting from the rear end of the bar until the entire captive length of the sleeve and the wire therein are withdrawn from bar 15. The end of wire 27 remains safely secured to the bar due to the manner in which it is anchored to insulation plate 17.

As the forward movement of the missile continues, the free portion of sleeve 30 will become straightened out forward of the end of bar 15 to which the sleeve and the wire therein are anchored. Up to this moment no wire can be withdrawn from the magazine as wire 35 maintains sleeve 30 stationarily in reference to eye 29. The tensile strength of wire 35 is selected so that it is less than the tensile strength of sleeve 30. Accordingly, wire 35 will be broken when the missile and with it eye 36 move beyond the point at which sleeve 30 is straightened out. Wire 27 will now be withdrawn from the magazine as the missile continues its flight.

As it is evident from the previous description, withdrawal of the wire from the magazines does not begin until the missile has substantially left the launching barrel and thus no part of unprotected wire is exposed to the blast of the exhaust gases during the launching operation.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A wire-guiding device of a ground-controlled rocket-type missile which is launched from a stationary launching barrel and when in flight is connected to a stationary transmitter by at least one conductor wire for transmitting control signals to the missile, said device comprising a wire magazine arranged to be secured on the missile, a wire guide arranged to be secured on the missile, a wire-retaining means arranged to be secured on the launching barrel, said retaining means including an elongated gripping member for gripping a wire portion with a frictional grip, a conductor wire extending from within said magazine through said wire guide to said gripping member and along the same and being secured at its outer end to said retaining means, and a protective pliable sleeve loosely encompassing the wire between a point thereof adjacent to said wire guide and a point adjacent to the secured outer end of the wire, whereby a wire portion between the wire guide on the missile and the secured end on said retaining means is protected by said sleeve from the exhaust gases generated when the missile is launched and is gradually pulled out of said gripping member for withdrawal of the wire from the magazine when the missile becomes airborne.

2. A wire-guiding device of a ground-controlled rocket-type missile which is launched from a stationary launching barrel and when in flight is connected to a stationary transmitter by at least one conductor wire for transmitting control signals to the missile, said device comprising a wire magazine arranged to be secured on the missile, a wire guide arranged to be secured on the missile, a wire-retaining means arranged to be secured on said launching barrel, said retaining means including an elongated gripping member for gripping a wire portion with a frictional grip, a conductor wire extending from within said magazine through said wire guide to said gripping member and along the same and being secured at its outer end to said retaining means, a protective pliable sleeve loosely encompassing the wire between a point thereof adjacent to said wire guide and a point adjacent to the secured end of the wire, and frangible holding means holding said sleeve stationary in reference to said wire guide whereby a wire portion between said wire guide and the secured outer wire end on said retaining means is protected by said sleeve from the exhaust gases generated when the missile is launched and is gradually pulled out of said gripping member for withdrawal from the magazine when the missile becomes airborne, said holding means being broken when the sleeve is fully pulled out of said gripping member.

3. A wire-guiding device according to claim 2 wherein said gripping member comprises a substantially rigid channeled element and a cushion strip fitted into said channeled element to form therewith a receiving gap for receiving the respective portion of the sleeve and the wire therein with a frictional grip.

4. A wire-guiding device according to claim 3 wherein said channeled element has a substantially U-shaped cross section, one branch of said element terminating in an inwardly turned flange, said gap being defined between said cushion strip and said flange, and wherein said outer wire end is secured to said gripping member at one end thereof.

5. A wire-guiding device according to claim 2 wherein said frangible holding means comprises a restraining wire secured to said sleeve and held stationarily in reference to the wire guide, the tensile strength of said restraining wire being higher than the force required to pull the sleeve out of said gripping member but less than the tensile strength of the sleeve.

6. In an installation for launching a ground-controlled rocket-type missile which when in flight is connected to a stationary launching barrel by at least one conductor wire for transmitting control signals to the missile, in combination, a ground-based stationary launching barrel, an elongated rocket-type missile placed in said barrel for launching therefrom by exhaust gases of the missile, a wire magazine mounted upon the missile for withdrawal of conductor wire therefrom while the missile is

in flight, a wire guide mounted upon the outside of the missile rearward of said magazine in reference to the exhaust end of the missile, a wire-retaining means, said retaining means including an elongated gripping member secured at one end to an inside wall portion of said barrel and extending lengthwise of the missile, the forward end of the gripping member being located forward of said wire guide and the other end rearward thereof, said conductor wire extending from said magazine through said wire guide to and along said gripping member, frictionally held therein, the outer end of the conductor wire being secured to said retaining means, a pliable protective sleeve loosely encompassing the wire portion extending between said wire guide and the secured outer end of the wire, and frangible holding means securing the sleeve portion adjacent to the wire guide to the missile body whereby upon launching of the missile the initial forward movement thereof in reference to the barrel gradually

pulls the sleeve and the wire portion therein out of said gripping member until the sleeve and the wire portion therein are substantially extended between said wire guide and the secured outer conductor wire end, the continued forward movement of the missile causing breaking of the holding means and freeing the conductor wire for withdrawal from the magazine.

7. An installation according to claim **6** wherein said frangible holding means comprises a restraining wire secured to said missile and said sleeve, the tensile strength of said retaining wire being higher than the force required to pull the sleeve out of said gripping member but less than the tensile strength of the sleeve.

No references cited.

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