Dec. 14, 1948. H. G. JORDAN 2,456,284

FLUME FOR AIR LAID WIRE

Filed Dec. 8, 1945 2 Sheets-Sheet 1

FIG. 1

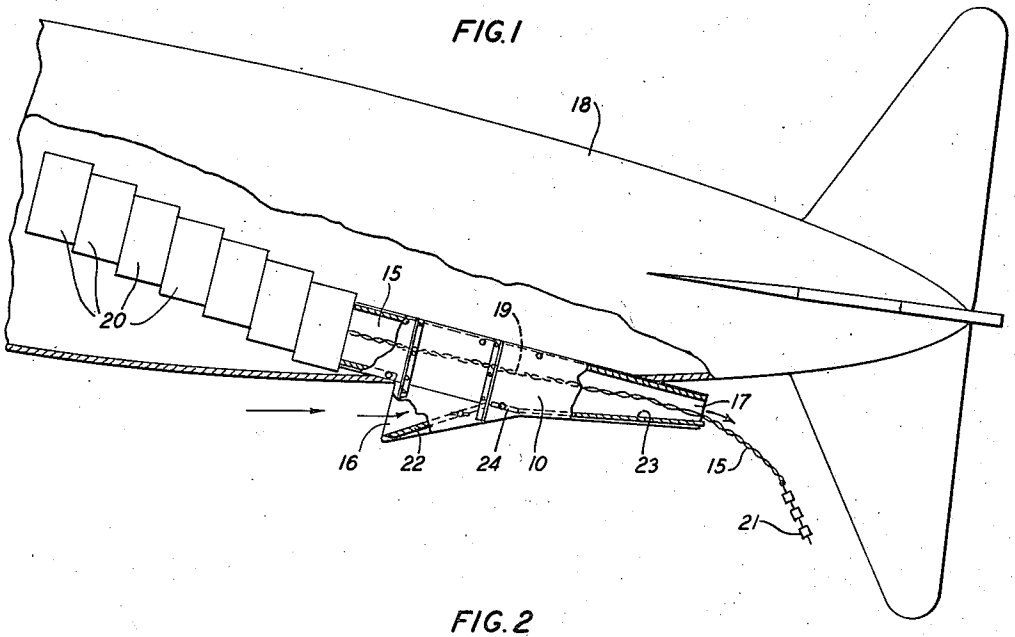

FIG. 2

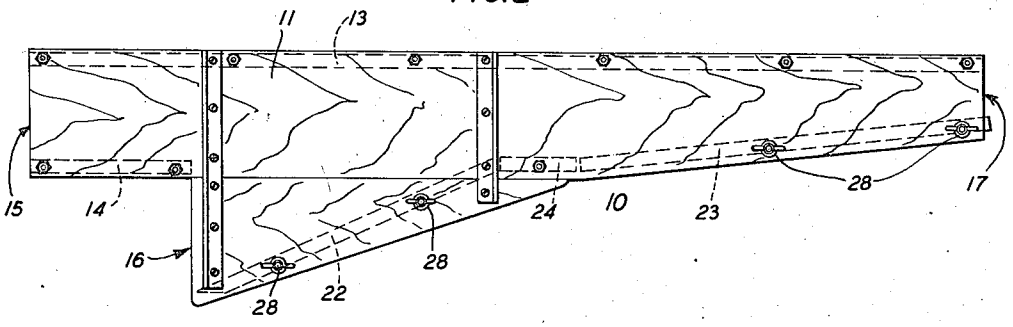

FIG. 3

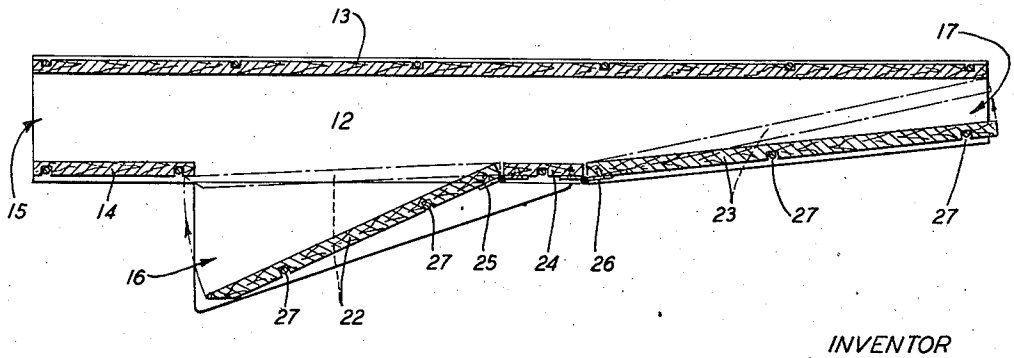

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FIG. 4

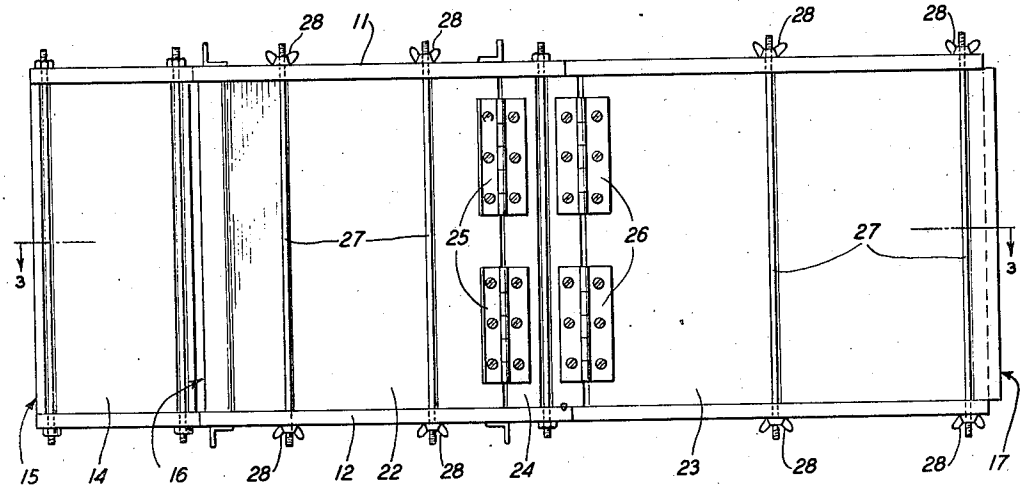


FIG. 5

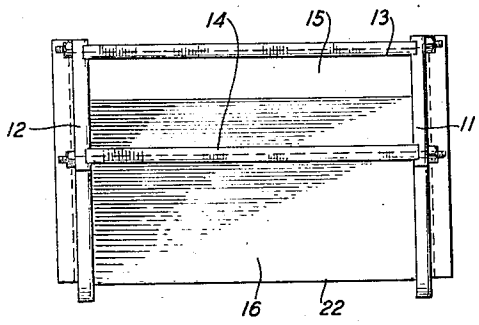
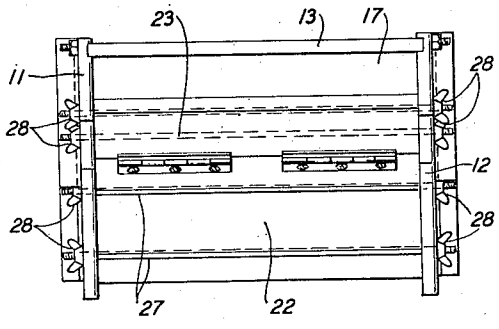


FIG. 6



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2,456,284

FLUME FOR AIR LAID WIRE

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8 Claims. (Cl. 244—137)

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This invention relates to the laying of communication wires from airplanes and more particularly to means for guiding and accelerating the paying out of the wires.

The object of this invention is the provision of means for guiding wires from airplanes, as they leave the plane and at the same time accelerate their passage through the guide.

Another object of this invention is the provision of means for guiding and accelerating wires as they are paid out of an airplane which utilizes the wash from the propeller to accelerate the passage of the wire.

In the methods of laying communication wires from fast-moving vehicles and in particular from airplanes which travel at high rates of speed, for example, the method as shown and described in U. S. Patent No. 2,436,402, issued to R. K. Potter, February 24, 1948, it has been found that trouble was experienced with breaks in the wire during the laying process or immediately thereafter. Also, even where successful lays were accomplished the tension in the laid wire was too great to allow enough margin against subsequent breakage, particularly where the wire had to fit itself to the rough terrain.

With the method employed in the patent heretofore referred to, the section of the wire between the plane and the ground at any given instant has to absorb all the force required to pull the subsequent sections of the wire out of the pack in the plane.

The accelerating force required to start increments of wire from a state of rest with respect to the plane, to a speed of 150 miles per hour is considerable, and any small jerks transmitted from the ground to the plane, in addition to the tension of the acceleration, are often enough to cause a break. Hence any means to relieve the tension on the wire between the ground and the plane would increase the margin against breakage. It is with such a means that this invention is concerned, i. e., a discharge flume or guide for the wire, mounted in the fuselage of the plane, which makes use of the slipstream and the propeller wash to accelerate the passage of the wire and the consequent reduction of the tension on the wire.

The flume or guide of this invention is provided with three ports, viz., an intake port for feeding the wire into the flume, an air inlet port exposed to the outside atmosphere for picking up a portion of the slip stream and the propeller wash, and an exhaust or wire outlet port for feeding the wire and the high velocity

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air blast into free space between the plane and the ground.

The flume of this invention is constructed in accordance with a theory based on Bernoulli's theorem, according to which a confined stream of air when passing through a constricted section increases in velocity when passing through that section. Therefore, an air blast picked up by a relatively large inlet port and then fed through a constricted exhaust port will gain enough velocity to exert considerable pull on the wire passing through the port and the magnitude of the pull in turn will depend on the square of the velocity.

In mathematical terms the force exerted on the wire by the air blast is:

$$F=V^2Ak$$

where V is the velocity of the air blast in miles per hour, A is projected area of the wire affected by the blast in square feet and k is a constant which has been published in the Institute of Electrical Engineers' Journal for February 1929 as 0.003.

Assuming, a 200 miles per hour blast of air operating against two 20-inch loops of wire in the flume:

$$F=V^2Ak=200^2\times\left(\frac{\left(\frac{.135^*+.270}{2}\right)\times 2\times 20}{144}\right)\times 0.003=7 \text{ pounds}$$

*Diameter of the wire.

or about a 20 per cent decrease in the tension of the lay when compared to the usual 35-pound tension in wire laid without expulsion assistance, for example, the Potter application heretofore referred to.

The air intake and air and wire exhaust force may be made adjustable to control the tension of the laid wire.

My invention will be more clearly understood from the following description made with reference to the accompanying drawings of which:

Fig. 1 is a fragmentary top plan view with portions broken away of a tail section of an airplane with the flume of this invention mounted in the side thereof with the wire passing therethrough;

Fig. 2 is a top plan view of the flume of this invention with the adjustable port gates shown in dotted lines;

Fig. 3 is a longitudinal section view taken on line 3—3 of Fig. 4, with the closed position of the port gates indicated in dot and dash lines;

Fig. 4 is a front elevational view of Fig. 1 showing the hinged port gates;

Fig. 5 is an end view of the wire inlet port and the air inlet port; and

Fig. 6 is an end view of the air and wire outlet port.

In accordance with the preferred embodiment of my invention, as shown in Fig. 1, and more in detail in the remaining figures, 2 to 6, inclusive, I have provided a flume or guide tube 10, having top portions 11 and 12 and side walls 13 and 14, with a wire inlet port 15, an air inlet port 16, and a wire and air outlet port 17. This flume 10, as shown in Fig. 1, is adapted to be mounted in the side of the fuselage 18, at the rear thereof with the wire inlet port 15 located inside of the plane fuselage 18. The air inlet port 16 is located outside of the fuselage 18 facing the front of the plane and the air and wire outlet port 17, also located outside of the plane, faces the rear.

As shown in Fig. 1, the paired wires 19 are stored in suitable containers 20, which are so positioned in the plane that the wires contained therein may be readily withdrawn therefrom, and pass into the flume 10 through the wire inlet port 15 and out of the plane through the air and wire outlet port 17, the end of said wires having a suitable weight 21 attached thereto.

Inasmuch as the air inlet port 16 is exposed to the onrushing air of the slipstream and propeller wash, a high velocity jet of air will be forced through the flume 10 and out of the air and wire outlet port 17. This high velocity jet of air passing through the flume 10 will exert considerable pull on the wires 19 and cause their passage therethrough to be greatly accelerated thereby reducing the tension on the wire and the resultant strain.

As shown in Figs. 2, 3 and 4, air inlet port 16 and air and wire outlet port 17 are provided with adjustable gates 22 and 23 which may be so positioned as to regulate the amount of air taken in and the amount of air expelled. These gates 22 and 23 form part of the side wall 15 of the flume 10 and are hingedly connected to the wall section 24 thereof by means of suitable hinges 25 and 26 and are locked in position by means of the rods 27 and wing nuts 28.

From the foregoing it will be observed that the pair of wires 19 as it leaves the container 20 and passes through the wire inlet port 15 of the flume 10, will encounter a blast of air entering the air inlet port 16. This blast of air entering the flume 10 and being forced through the constricted air and wire outlet 17 will greatly increase the velocity of the air and will have a nozzle effect. This jet or nozzle effect will increase the velocity of the air to such a degree that it will exert a considerable pull on the wires passing therethrough and consequently accelerate the passage of the wire in the flume and the consequent decrease in tension of the wire between the ground and the plane.

While I have shown and described the preferred embodiment of my invention, it is to be understood that various changes in design and construction may be made therein without departing from the spirit of the invention and that I am only limited by the scope of the appended claims.

What is claimed is:

1. A discharge device for guiding air laid wires from airplanes and the like which comprises in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane

and having a wide wire receiving inlet port at one end and a relatively narrow wire discharge outlet port at the other and an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it through said flume to accelerate the passage of wires therethrough.

2. A discharge device for guiding air laid wires from airplanes comprising in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane and having converging side walls to form a wide wire receiving port at one end and a relatively narrow wire discharge outlet port at the other and an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of wires therethrough.

3. A discharge device for guiding air laid wires from airplanes and the like comprising in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane and having a wide wire receiving inlet port at one end and a relatively narrow wire discharge outlet port at the other, an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of a wire therethrough and said air inlet port and wire discharge outlet port having means for adjusting the openings thereof.

4. A discharge device for guiding air laid wires from airplanes comprising in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane having converging side walls to form a wide wire receiving port at one end and a relatively narrow wire discharge outlet port at the other and an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of wires therethrough, said air inlet port and wire discharge outlet port having means for adjusting the openings thereof.

5. A discharge device for guiding air laid wires from airplanes comprising in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane and having converging side walls to form a wide wire receiving port at one end and a relatively narrow wire discharge outlet port at the other, an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of wires therethrough and a portion of said side walls adjacent said air inlet port and said wire discharge outlet port being adjustble to vary the opening thereof.

6. A discharge device for guiding air laid wires from airplanes comprising in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane and having converging side walls to form a wide wire receiving port at one end and a relatively narrow wire discharge outlet port at the other, an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of wires therethrough and a portion of said side walls adjacent said air inlet port and said wire discharge outlet port hingedly supported to provide gates for varying the size of said port.

7. A discharge device for guiding air laid wires from airplanes comprising in combination, an

airplane, an elongated flume mounted in the fuselage of said airplane and having converging side walls to form a wide wire receiving port at one end and a relatively narrow wire discharge outlet port at the other, an air inlet port facing forward and opening into said flume adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of wires therethrough, a portion of said side walls adjacent said air inlet port and said wire discharge outlet port adjustable to vary the opening thereof and means for locking said side walls in position.

8. A discharge device for guiding air laid wires from airplanes comprising in combination, an airplane, an elongated flume member mounted in the fuselage of said airplane and having converging side walls to form a wide wire receiving port at one end and a relatively narrow wire discharge outlet port at the other, an air inlet port facing forward and opening into said flume

adjacent said wire receiving port for scooping up air and forcing it into said flume to accelerate the passage of wires therethrough, a portion of said side wall adjacent said air inlet port and said wire discharge outlet port hingedly supported to provide gates for varying the size of said port and means for locking said gates in position.

HOMER G. JORDAN.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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FOREIGN PATENTS

Number	Country	Date
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