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PROJECTION OF TWISTED WIRES

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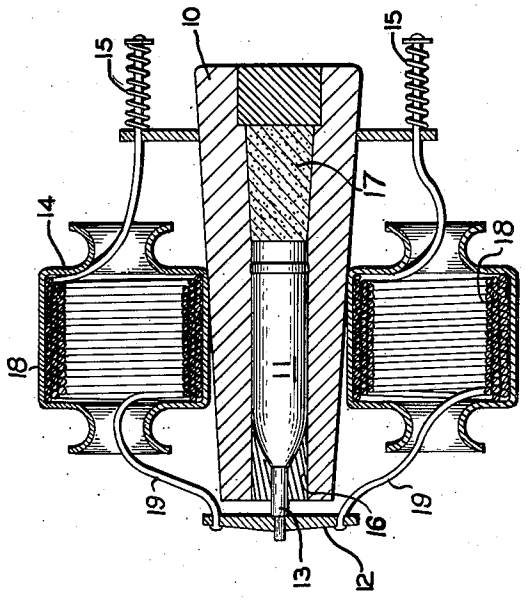


Fig. 1

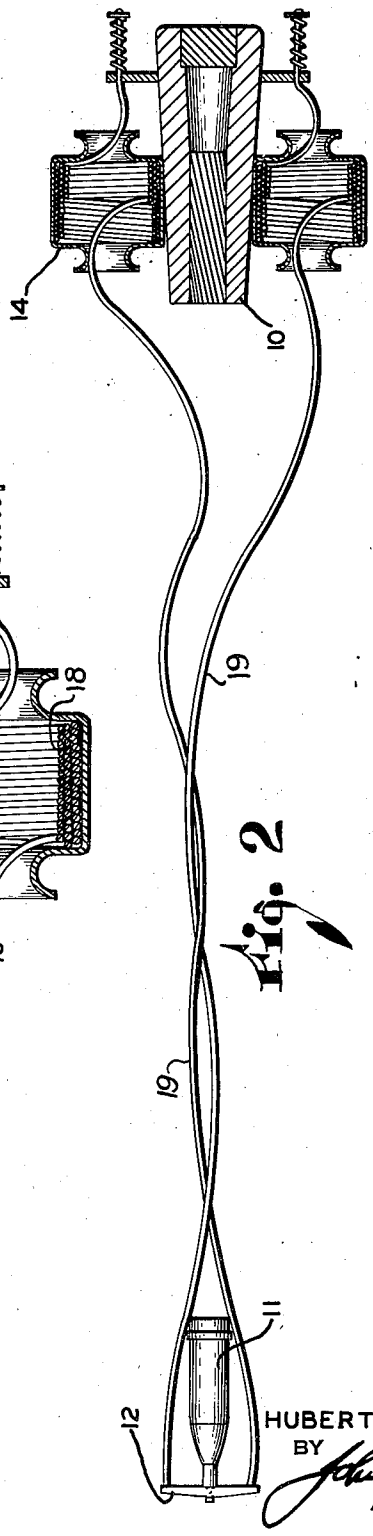


Fig. 2

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PROJECTION OF TWISTED WIRES

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5 Claims. (Cl. 89—1)

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This invention relates to the rapid laying of telephone and other lines across dangerous terrain or terrain impossible for men to traverse.

In warfare the forward units are often in a position in which, although somewhat protected, they cannot be reached from friendly adjacent bodies of troops. Communication with such bodies is difficult and uncertain, heavy reliance being placed on the telephone. When the line parts, attempts to repair it or lay another line must await an opportunity.

There are also times, apart from war, when it is desirable or necessary to span a distance with telephone line, which distance cannot be spanned by a man, vessel or vehicle traversing it. For such purposes, the present invention is suited.

One method of establishing communication in such situations as outlined above is by projecting a line through the air, trailing it behind a fired slug. However, difficulties develop in such a procedure, as it has been found that firing a line by means of a Lyle gun, and then pulling the telephone wires by means of the line is difficult or impossible over rough terrain. Attempts to substitute a telephone wire for the fibrous line used with such guns involve difficulties due to the stiffness of the wires and their construction, involving, as it does, a pair of twisted wires with an irregular surface. Coils of this wire are extremely difficult to pay out at projectile velocities, as the coil cannot be accelerated to the desired speed in the short time the projectile reaches its maximum velocity. Attempts to draw the wire from one end of a stationary coil, in an axial direction, result in kinking and snarling of the wire, due, apparently, to the irregular surface.

With the above difficulties in mind, it is a primary object of the present invention to provide a method of projecting twisted wires by means of a fired projectile.

It is a further object of the present invention to provide a method for laying telephone wires which can utilize a projectile and which can be employed without requiring that coils of twisted wire be used.

Referring now to the drawings:

Fig. 1 is a view, in section, and diagrammatic in nature, of one form of apparatus for practicing this invention; and

Fig. 2 is a similar view of the same apparatus in operation.

The principle upon which the present invention operates is the utilization of coils of single wires which, as wire is withdrawn from the coil, tend to twist together. The agency for carrying the

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wire consists of a projectile which pulls the wires from the coils and, at the same time, because of its rotation, permits or assists the twisting of the wire.

A cannon 10 having rifling 16 is shown, which is capable of firing the projectile 11 upon ignition of the propelling charge 17. This cannon may be of any suitable nature, such as an artillery mortar, or a specially designed piece. As shown, the bore is quite short, as the required muzzle velocity is low and also part of the projectile projects from the bore before firing.

The projectile 11, is provided with arms projecting from diametrically opposite points. These arms 12 are shown as mounted on a short central rod 13 which is in turn mounted on the nose of the projectile body. If the piece 10 is breech loading, the arms may be secured in place after the projectile is in the bore. They are rigid with the rest of the projectile, and thus rotate with it.

The supply of wire is shown as mounted in cylindrical casings 14, which are secured to the piece 10. However, they need not be actually mounted thereon, and might be separate therefrom. Further, although they are shown as diametrically opposite each other with respect to the bore of the piece, which is theoretically correct, they can actually be, for instance, below the piece, if desirable.

In the shown form, the coils 18 are solenoidal, closely wound layers of wire. These coils are readily formed by winding on a rotating mandrel in the usual fashion. Both are wound on the same hand. They may then be inserted in the casing 14. As shown, these casings are provided with axial openings with rounded edges to assure free running out of the wire. The inner end of the wire 19 is the first to leave the coil, and the outer end may be fastened to any suitable support or to another coil, if desired. A spring 15 has been shown for absorbing part of the shock arising when the projectile reaches the target, but proper firing will result in the projectile just barely reaching the desired point, so no very elaborate shock absorbing devices will be required.

It is to be understood that although the wires are shown as in separate cases, they can actually be wound side by side on the same mandrel, the wires alternating convolution by convolution, and the device will work as it does with two separate coils. However, the principle of operation is more easily understood in the shown form.

In order for the device to function properly, it is necessary that there be a certain relationship

between the rifling of the piece 10 and the coils of wire. The wire of a coil made in the fashion described will, upon being pulled out axially, be found to have a twist in it. This twist amounts to one turn per convolution of the coil, or very nearly that value.

If two wires are both given such torsional deformation, they will be found to have a positive tendency to twist around each other, thus forming the desired twisted pair of wires.

In the apparatus shown, assuming perfect torsional elasticity in the wire while twisting one turn per convolution, the tendency of the wires to twist into a pair would be such as to cause the wires to form a definite number of lays per convolution. The exact number can be calculated, but for practical purposes one lay per convolution is the value aimed at. Friction between the wires and resistance to bending of the wires have their effects on the exact lay attained. Furthermore, the relation between the rotation and linear travel of the projectile changes constantly, due to air resistance acting to slow the rotation and the velocity along line of flight, gravity changing the vertical component of that velocity, and the drag of the wire slowing the velocity along the line of flight. These effects can be somewhat balanced by the selection of the proper inner and outer diameters of the coils. For practical purposes the device works well enough if the projectile turns once for each coil pulled out, on the average.

Fig. 2 shows the projectile in flight, being otherwise the same as Fig. 1. As can be seen, the projectile is turning to the right, as viewed from the breech, and the wire unwinds in the same direction, as seen from the same point. These relationships are correct for operation of the device.

Although the device has been shown with a projectile which is fired from a rifle, it is to be understood that any rotating moving body can be used for towing. Rockets propelled by jets set at an angle to cause rotation of the rocket body can be used, but the principle remains the same. Provision for protecting the wires from the hot gases emerging from the jets can be made by towing a length of steel cable immediately behind the rocket, to which the wire may be attached, as steel cable is resistant enough to the action of the heat to which it would be subjected.

It is to be understood that the above description is intended to be illustrative of the invention only, and not limitative, as various modifications may be readily made without departing from the scope of the appended claims.

I claim:

1. Apparatus for laying twisted wire by towing behind a projectile comprising a projectile, means causing rotating flight of said projectile, a pair of wires coiled for withdrawal in a direction axial of the convolutions of the wire, and means connecting the wires to the projectile for twisting upon rotation of said projectile during flight.

2. Apparatus for laying twisted wire by towing behind a projectile comprising a projectile, means causing rotating flight of said projectile, a plurality of coils of wire, each coiled for withdrawal in a direction axial of the coil, and means connecting the wire of each coil to the projectile for twisting upon rotation of said projectile during flight.

3. Apparatus for laying wire by towing behind a projectile comprising a projectile, means causing rotating flight of said projectile, a coil of wire coiled for withdrawal in a direction axial of the coil, the direction of uncoiling being of the same hand as the rotation of the projectile, and means connecting the wire to the projectile, whereby the torsional deformation of the wire engendered by its withdrawal from the coil is counteracted by rotation of the projectile during flight.

4. Apparatus for laying twisted wire by towing behind a projectile comprising a projectile, means causing rotating flight of said projectile, a plurality of coils of wire, each coiled for withdrawal in a direction axial of the coil, the direction of uncoiling being of the same hand as the rotation of the projectile, and means connecting the wire to the projectile, whereby the torsional deformation of the wire engendered by its withdrawal from the coil is counteracted by the rotation of the projectile which also twists the wires together.

5. Apparatus for laying twisted wire by towing behind a projectile comprising, a projectile, a gun having rifling in the bore thereof for causing rotating flight of said projectile, a plurality of coils of wire, means connecting each of the wires to the projectile, each coil coiled for withdrawal in a direction axial of the coil, the direction of uncoiling being of the same hand as the rotation of the projectile, the diameter of the coils being related to the rifling so that substantially one convolution will be drawn from each of the coils for each revolution of the projectile.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
281,041	Evans et al.	July 10, 1883
2,399,136	Mount	April 23, 1946

FOREIGN PATENTS

Number	Country	Date
302,968	Germany	Jan. 12, 1918