Oct. 27, 1959 R. LEIDOLF 2,910,256

ACCORDION WIRE COILS

Filed Aug. 30, 1957 2 Sheets-Sheet 1

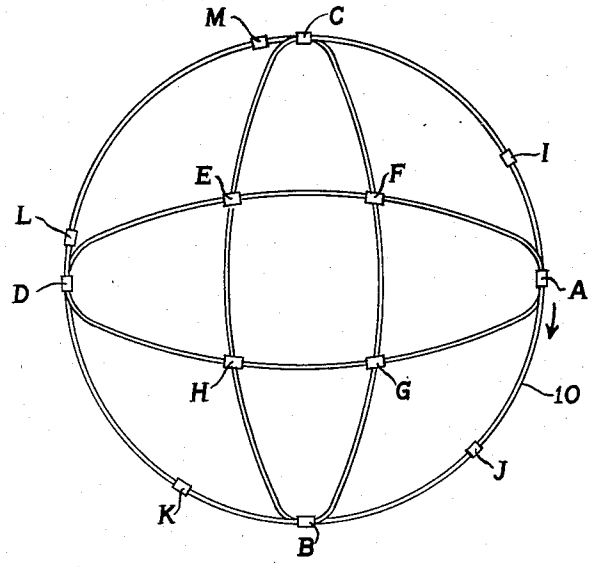


Fig. 1.

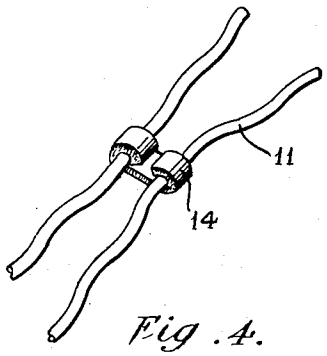


Fig. 4.

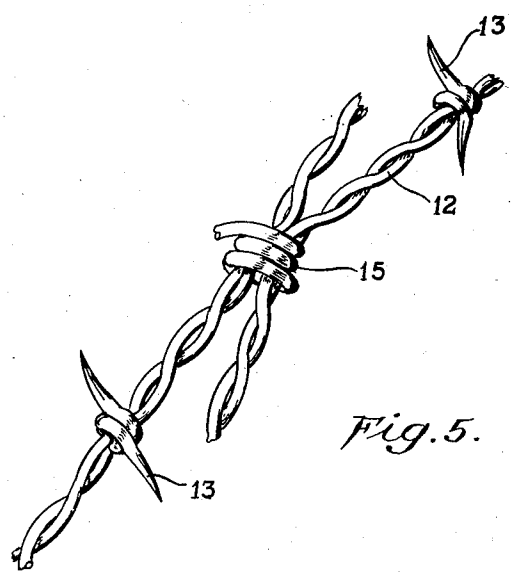


Fig. 5.

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Oct. 27, 1959 R. LEIDOLF 2,910,256

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Filed Aug. 30, 1957 2 Sheets-Sheet 2

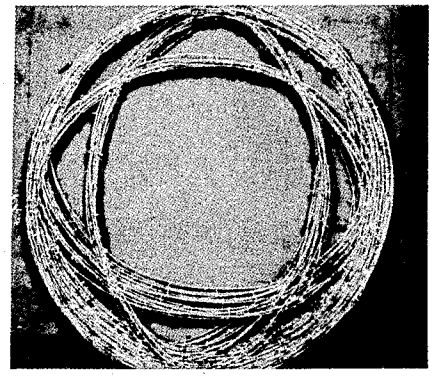


Fig. 2.

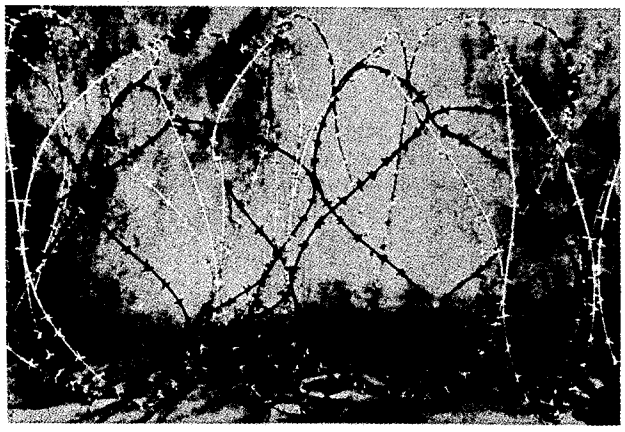


Fig. 3.

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ACCORDION WIRE COILS

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8 Claims. (Cl. 245—1)

This invention relates to an improvement in accordion wire coils.

This application is a continuation-in-part of my application, now abandoned, Serial No. 483,107, filed January 20, 1935.

Accordion wire coils have been furnished in the past primarily in form of stranded wires provided with barbs and wound helically at uniform diameter. The use of such barbed wire coils as obstacles has been confined, almost exclusively, for military purposes. In view of the speed and simplicity at which they can be erected, barbed wire obstacles of this type are greatly superior to the barbed wire entanglements of, say, the first World War, which consisted either of wooden posts set firmly into the ground or, if this was not feasible, of chevaux-de-frise, and barbed wire stretched laboriously by hand between the posts or stakes of the chevaux-de-frise. Notwithstanding the obvious advantages of these barbed wire coils, they also have certain disadvantages. The diameter thereof is of the order of about one yard and, since adjacent convolutions are not interconnected, there is always the possibility of someone crawling lengthwise through the obstacle or slipping through it by separating adjacent convolutions. Moreover, these obstacles readily collapse under the weight of heavy boards or wooden beams thrown on top thereof.

It is the main object of the present invention to provide an obstacle of this general type provided with an interior lacing and interconnected convolutions to prevent longitudinal or lateral passage thereof and to improve the resistance of the obstacle against collapse.

It is another object of the invention to broaden the utility of obstacles of this type by providing them without barbs and thus make them useful as a barrier to restrain crowds at parades, sporting events, constructions, street excavations, fires and various disasters and thus to provide, say, the police or other safety organs with an efficient obstacle of relatively little bulk and light weight that can be quickly set up and just as quickly removed and kept bundled for subsequent use. In view of the improved properties of the barbed version thereof, the obstacle lends itself excellently for more or less permanent fencings of air fields, military installations such as target ranges, camps, etc.

An accordion wire coil of this invention, comprising a continuous, helically wound single or stranded wire, with or without barbs attached thereto, is characterized in that between groups of several adjacent principal convolutions of equal diameter one or several intermediate convolutions are provided having relatively smaller radii or different curvatures than the principal convolutions. Thus, by providing, for example, elliptical intermediate convolutions between groups of circularly-wound, principal convolutions, a barrier with an impenetrable interior is formed which, moreover, is greatly improved in stability and resistance against collapse if, as according to this invention, the intermediate convolutions are deformed into extending within the principal convolutions

and adjacent principal convolutions, principal and intermediate convolutions and adjacent intermediate convolutions are fastened to each other by means of clamps, clips or other suitable means.

The novel features which I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, and any additional objects and advantages thereof will be best understood from the following description of preferred embodiments thereof when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a schematic front view of an accordion wire of this invention;

Figs. 2 and 3 are photographs of one of the hereinclaimed accordion wire coils in bundled and expanded condition, respectively, and

Figs. 4 and 5 illustrate different types of wires used in making said accordion wire coils and clips and other means for joining such wires.

Fig. 1, representing a schematic front view of a continuous accordion wire coil **10**, illustrates the principle of this invention. According to a preferred method, the wire coil is wound in such a manner that 2¼ circular convolutions are followed by one elliptical convolution. While the circular windings constitute the principal elements of the wire coil, the elliptical convolutions constitute the intermediate elements. Thus, if the coil or roll commences at A, the first elliptical convolution BC starts at B after 2¼ circular windings. Beginning at B, another 2¼ circular windings follow, to be succeeded by the elliptical convolutions DA which, as shown, is perpendicularly offset against the elliptical convolution BC. This scheme is maintained during the entire winding operation so that the resulting coil comprises, for every 68 circular principal convolutions, 29 elliptical intermediate convolutions.

The clamping of the wire coil is threefold. First, the circular principal convolutions are clamped together at the peripheral points I, J, K, L and M, preferably offset 72° against each other. Secondly, intermediate convolutions are connected with the nearest principal convolutions at the points A and D, and B and C, respectively. Lastly, intermediate convolutions nearest to each other are interconnected at the points E and F, and G and H, respectively.

Upon expanding the coil to form an obstacle, the interconnections between any two intermediate convolutions causes a deformation and extension of these convolutions within the nearest principal convolutions whereby a coiled wire obstacle with an impenetrable interior is produced. Since, as a result of the aforementioned clamping between principal convolutions and between principal and intermediate convolutions, the helical shape of the former is also deformed, although to a lesser degree, the density of the obstacle is further increased and, which is also very important, the coil cannot be expanded beyond a fixed extent. Moreover, while the individual principal and intermediate convolutions are distorted when the coil is expanded in order to serve as an obstacle, as shown in Fig. 3, the distortions follow a regular and desirable pattern and the pitch of identical convolutions is the same. When, after completion of its task the obstacle is gathered together and compressed into a bundle for storage and further use, the distortions disappear and the coil automatically assumed its original shape, shown in Fig. 2.

Although I have found the afore-stated ratio of 68 principal convolutions to 29 intermediate convolutions to be the most practical in order to produce, by means of the aforedescribed interconnections, an internally dense and very stable obstacle, it will be obvious that this ratio and/or system of clamping convolutions to

each other can be changed without departing from the spirit of this invention. Thus, it is possible to increase, for example, the number of principal convolution turns from 2¼ to, say, 3¼ before inserting an intermediate convolution, or to intersperse sets of principal convolutions with two or more adjacent intermediate convolutions of the same or different pitch.

The manufacture of the coils involves close winding and interconnecting the convolutions as described. Various types of wire can be used. Fig. 4 illustrates a plain single wire **11**, while Fig. 5 shows a stranded wire, provided with barbs **13**. Single wires, provided with barbs, may be used. For this purpose, the single wire is preferably crimped, as shown in Fig. 4, in order to avoid displacement of the barbs. Two different types of clamping means **14** and **15** are illustrated in Figs. 4 and 5, but it will be evident that any other type of fastener may be used which provides a sufficiently strong connection.

One material producing a preferred embodiment of the herein-claimed accordion wire coil is a spring steel wire, 3 mm. in diameter and having a minimum tensile strength of about 140 kg./mm. sq. In order to make a barbed wire coil therefrom, the wire is slightly crimped and barbs, made from mild steel wire about 2 mm. in diameter, are attached thereto about 4 to 4.5 inches distant from each other. The principal turns of the coil are preferably made about 40 inches in diameter, while the selection of the shorter diameter of the elliptical turns is more or less discretionary. In the wire coil shown in Fig. 2, they are somewhat in excess of one-half of the long diameter. The winding is continued until, after clamping and extending, a coil of about 40 to 45 ft. in length is produced. The weight of such a coil is about 56 lbs. and the loading space needed for 100 coils in bundles is about 21.5 cu. yds.

I found it practical to fit each coil with four bundling loops which have the additional purpose of attaching several coils to each other and to thus provide continuous obstacles of any desired length. Although the extended coil remains in position without any fastening to the ground, earth hooks and similar means may be used to prevent dislocation of the obstacle. Enclosures with hedges become impenetrable if provided with the herein-claimed accordion coil. After a period of time, the young hedge overgrows the coil so that it is no longer visible. If a higher barrier is desired, two coils may be placed side by side and a third coil placed onto these two coils and fastened thereto.

I claim:

1. An accordion wire coil comprising a length of wire wound into a succession of groups of circular principal convolutions of the same diameter, each group followed at least by one intermediate elliptical convolution whose longer diameter has substantially the same length as the diameter of the principal convolutions, and clamping means fastening to each other in a regular pattern adjacent principal convolutions, principal convolutions and adjacent intermediate convolutions, and adjacent intermediate convolutions at the points of nearest approach to each other to thereby provide a coil with an interior lacing and interconnected convolutions preventing both longitudinal and lateral passage therethrough.

2. An accordion wire coil as set forth in claim 1, wherein said intermediate elliptical convolutions are alternately offset 90° against each other.

3. An accordion wire coil as set forth in claim 1, which is made from a single wire.

4. An accordion wire coil as set forth in claim 1, which is made from a stranded wire.

5. An accordion wire coil as set forth in claim 1, which is made from a barbed wire.

6. An accordion wire coil comprising a length of spring steel wire forming successions of 2¼ windings of circular principal convolutions of the same diameter, followed by single elliptical intermediate convolutions whose longer diameter has substantially the same length as the diameter of the principal convolutions, whose shorter diameter has about one-half of that length and which are alternately offset 90° against each other, clamping means fastening adjacent principal convolutions at regular intervals to each other, clamping means fastening the extremities of said intermediate convolutions to adjacent principal convolutions, and clamping means fastening adjacent intermediate convolutions at the points of nearest approach to each other to thereby provide a coil with an interior lacing and interconnected convolutions preventing both longitudinal and lateral passage therethrough.

7. An accordion wire coil as set forth in claim 6, wherein said wire forms successions of 3¼ windings of circular principal convolutions.

8. An accordion wire coil as set forth in claim 6, wherein said clamping means fastening adjacent principal convolutions to each other are attached at 72° intervals.

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