

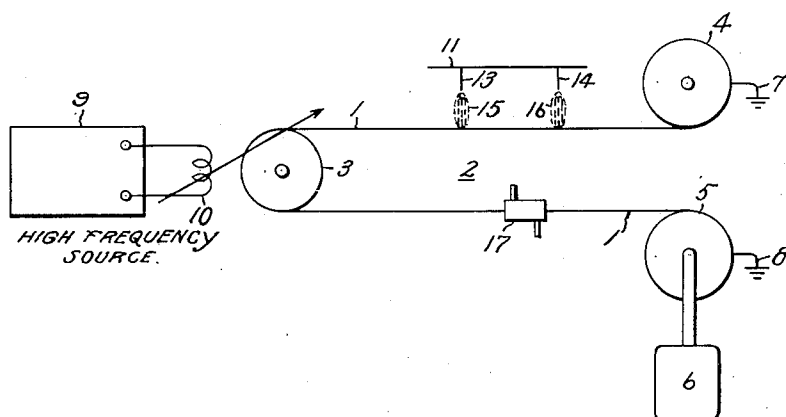
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HIGH-FREQUENCY CORONA ARC HEATING APPARATUS

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HIGH-FREQUENCY CORONA ARC HEATING APPARATUS

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Our invention relates to high frequency corona arc heating apparatus, and has for its object simple and efficient apparatus for heating electrically conducting wire, such as for annealing purposes, by high frequency corona arc discharge.

For a more complete disclosure of our invention reference should be had to the accompanying drawing the single figure of which is a diagrammatic representation of high frequency apparatus for heating a continuously moving wire embodying our invention.

Referring to the drawing, in carrying out our invention in one form we pass the wire 1 made of an electrically conducting material such as copper in the form of a horizontal loop 2 over an electrically insulated pulley or drum 3 between two spools 4 and 5. As shown the spool 5 is driven by an electric motor 6 and pulls the wire from the spool 4, suitable braking means (not shown) being provided for the spool 4 for maintaining the wire under a suitable uniform tension to prevent substantial sag in the wire. The two ends of the wire loop 2 at their junctions with the spools are provided with ground connections 7 and 8 through the spools which are made of an electrically conducting material whereby the two ends of the wire loop are electrically connected together through ground.

Power is supplied to the wire loop by means of a high frequency oscillation generator 9 having a coupling coil or inductor 10 in which current is generated at a suitable high frequency, such as 23 megacycles. This coil 10 is mounted in close electromagnetic inductive relation to the wire loop 2, preferably as shown near the pulley 3, so that high frequency currents are induced by the coil in the loop and a standing wave produced on the wire. Preferably the wire is one-half wave length long between each of the ground connections 7 and 8 and the pulley 3 so that the coupling point at the pulley 3 is a low voltage point.

For the production of corona arc discharges we provide a metal plate 11 mounted on a suitable electrically insulating support (not shown) adjacent one length or side of the loop, as shown adjacent the upper length or side and at a maximum voltage point of the standing half wave produced on that side of the wire, i. e., at a point substantially midway between the pulley 3 and the reel 4. The plate 11 floats above ground so that the capacity between the plate and ground is very small. It is provided with a plurality of arc rods, or projections, as shown two rods 13 and 14, extending from the plate toward the wire with

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their ends in suitable equally spaced relation with the wire so that one or more high frequency corona arcs 15 and 16 are set up between the ends of the rods and the wire.

We have found that by means of the arcs 15 and 16 the wire is heated to a high temperature, such as a cherry red, as it moves past the arcs whereby the wire is annealed. Suitable cooling means, such as a water cooler 17 may be provided to cool the wire before it is wound on the spool 5.

While we have shown a particular embodiment of our invention, it will be understood, of course, that we do not wish to be limited thereto since many modifications may be made and we therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. High frequency apparatus for heating a continuously moving wire made of electrically conducting material comprising means for passing a wire continuously over a predetermined path, ground connections for the ends of a predetermined length of said wire, a source of high frequency current having a wave length at least not substantially longer than said length of wire, means inductively connecting said source to said wire so as to produce a standing voltage wave on the wire having at least one maximum voltage to ground point, an electrically conducting member mounted adjacent a maximum voltage to ground point of said wave and provided with a capacity connection to ground, and an arcing projection on said member providing for corona arc discharge between said member and the wire and heating of the wire.

2. High frequency apparatus for heating a continuously moving wire made of electrically conducting material comprising two spools, means for turning one of said spools thereby to pull a wire from the other spool and wind it on said first spool, ground connections for said spools, a source of high frequency current having a wave length at least not substantially longer than the length of wire extending between said spools, means inductively connecting said source to the wire at a point at least substantially one-half of said wave length from one of said spools whereby a standing voltage wave is produced on the wire having maximum voltage to ground points, an electrically conducting member mounted adjacent one of said maximum voltage points and provided with a capacity connection to ground, and an arcing projection on said

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member providing for corona arc discharge between said member and the wire and heating of the wire.

3. High frequency apparatus for heating a continuously moving wire made of electrically conducting material comprising a source of high frequency current supply having a predetermined frequency and wave length, a pulley, two spools for wire each positioned a distance from said pulley at least substantially one-half of said wave length, ground connections for said spools and the wire wound on said spools, means inductively connecting said supply source to the wire at a point adjacent said pulley whereby a standing voltage wave is produced on the wire having a maximum voltage to ground point between at least one of said spools and said pulley, an electrically conducting member mounted adjacent said maximum voltage point and provided with

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a capacity connection to ground, and an arcing projection on said member providing for corona arc discharge between said member and the wire and heating of the wire.

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