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APPARATUS FOR PRODUCING DISCONTINUOUS CONDUCTORS

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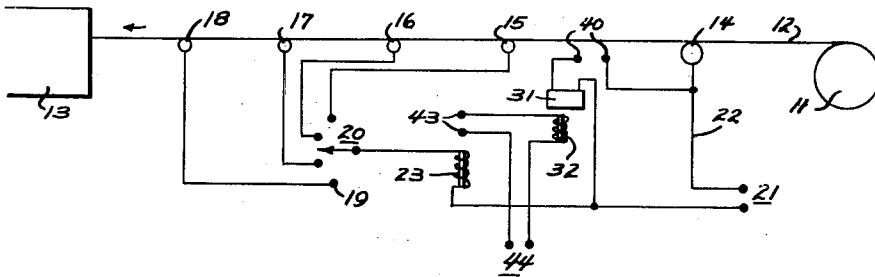


FIG. 1.

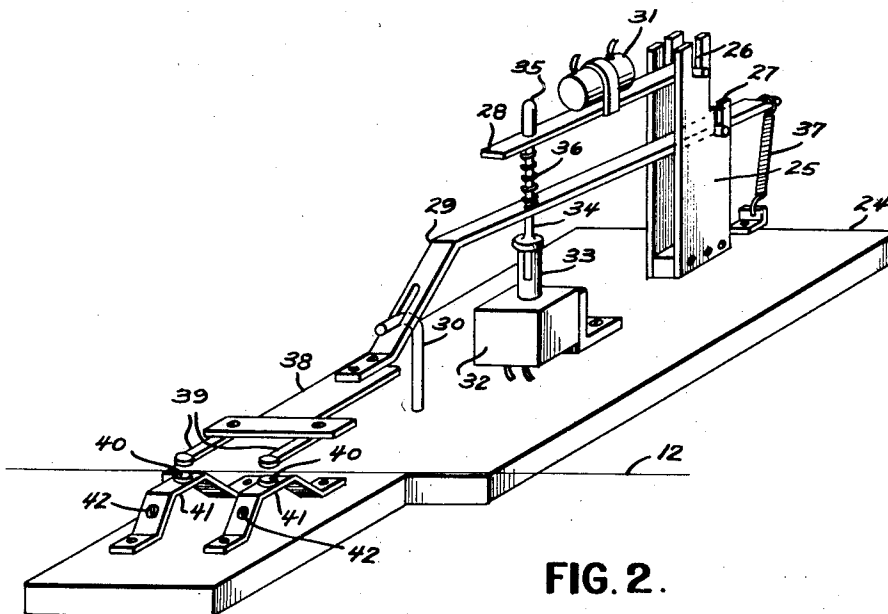


FIG. 2.

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APPARATUS FOR PRODUCING DISCONTINUOUS CONDUCTORS

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This invention relates to the production of electrical conductors and more specifically to methods and apparatus for producing a series of conductor lengths on a continuous insulating core.

A series of successive lengths of electrical conducting material on a continuous insulating core, such as is the subject of this invention, is called Tuned Rope. Tuned rope is useful in radar confusion operations. The choice of lengths of conducting material determines the particular frequency to which the confusion material will respond.

An object of this invention is to provide a method and apparatus for providing discontinuities in a length of conductor.

Another object of this invention is to provide an apparatus for breaking the electrical continuity of a lengthy conductor at a series of spaced points.

A further object of this invention is to provide an apparatus for breaking the electrical continuity of a lengthy conductor supported by an insulating core at a series of spaced points according to a predetermined schedule.

An additional object of this invention is to provide an apparatus for producing electrical discontinuities in a lengthy core supported wire at a series of predetermined spaced points.

Other objects and many attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

Fig. 1 shows a circuit diagram according to one embodiment of the invention,

Fig. 2 shows a structural arrangement of the burning contacts and the structure controlling the same, and

Fig. 3 shows an automatically operable selector switch which may be included in the structural arrangement of Fig. 2.

Referring to Fig. 1, the disclosed embodiment of the invention comprises a spool 11 supplying a continuous length of wire or thread 12 wound on a continuous length of core to a braider 13. An apparatus is included between the supply spool 11 and the braider 13 for producing breaks in the electrical continuity of the wire 12 at preselected intervals. One example of a suitable wire wound core is Tinsel Serving which consists of cadmium bronze thread wound on a core of insulating material known as fibre-glass.

The apparatus comprises a series of conductive guide members 14, 15, 16, 17, and 18, preferably in the form of rollers for supporting and guiding the continuous length of wire wound core 12 through the apparatus. The wire wound core 12 can be arranged to pass over roller 15, under 16, over 17, and under 18 so as to force a firm metallic contact between each roller and the wire, thereby insuring good electrical contact. Binding posts are provided on each of the roller supports for connecting leads to the plurality of fixed contacts 19 of selector switch 20. Roller 14 is electrically connected to one side of supply 21 by means of a lead 22 which is connected to the binding post on the support for roller 14. Any one of the other rollers may be connected to the other side of supply 21 by selectively positioning the movable contact of the selector switch. A relay coil 23 is included in the selector switch circuit. When the selector switch 20 is set in a particular position and supply 21 is energized, the wire 12 is adapted to complete a circuit through the supply 21 by bridging the roller 14 and the roller se-

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lected by switch 20. When a circuit is completed, the coil of relay 23 is energized. The function of relay 23 will be subsequently described.

In Fig. 2 is illustrated a combined switching and burning mechanism controlled by the relay 23. The mechanism comprises a base 24 having a bracket 25 fixedly mounted thereon. The bracket has two notches 26 and 27 for pivotally mounting arms 28 and 29 for free movement. The left end of arm 29 engages a stop 30 which limits any further clockwise motion. The opposite end of arm 29 is engaged by a tension spring 37, one end of which is fixed to the base 24 by means of an angle piece. The arm 28 supports a mercury switch 31 which is arranged to close when arm 29 pivots counterclockwise. A solenoid 32 is fixed to the base 24 and has a core 33. The core 33 is normally in an extended position but is adapted to assume a retracted position when the solenoid 32 is energized. Pivotally secured to solenoid core 33 is a rod 34 which has a button like end 35, the latter being arranged to abut the upper side of arm 28. A compression spring 36 is located on rod 34 between arms 28 and 29 to bias the arms 28 and 29 apart. When the core 33 is retracted as a result of energizing solenoid 32, rod 34 pivots the arm 28 counterclockwise. Mercury switch 31 is moved to closed position. The spring 36 upon being compressed is strong enough to move arm 29 against the pull of tension spring 37.

The left end of arm 29 is bent twice, each time at a 45 degree angle so as to provide a mounting surface for insulator 38 parallel to the length of arm 29. To the insulator 38 is fastened two separate and parallel strips of metal 39, each having a contact point at the extreme end. The contact points on strips 39 are located so as to strike two separate tungsten contact points 40 on separate supports 41 fastened to the base 24. The contact supports 41 are bent in such a manner as to bring the tungsten contact points 40 to a proper distance from the contacts on arm 29. Binding posts 42 are provided on the contact supports 41 for wiring purposes. Wire 12 moves along a path adjacent contacts 40 and is adapted to engage and electrically bridge contacts 40 when arm 29 is rotated counterclockwise.

The cooperation of the elements thus far set forth can best be described by reference first to Fig. 1. Assuming the selector switch set in a particular contact making position, for example the position in which roller 18 is connected to one side of supply 21. As the wire wound core 12 travels from 11 to 13, it will bridge rollers 14 and 18. When rollers 14 and 18 are bridged, an energizing current flows through relay coil 23. When energized, relay 23 causes contacts 43 to engage putting solenoid 32 directly across the supply 44. When solenoid 32 is energized, arms 28 and 29 are moved downwardly as previously described in connection with Fig. 2. When the arms are displaced in the counterclockwise direction, the wire is temporarily clamped between the contact points. The contacts 40 are bridged by wire 12 and almost immediately mercury switch 31 is closed. The resulting heavy current flowing through the wire 12 from source 21 is sufficient to cause a burning action which removes a small amount of the wire conductor 12. The resulting break in the electrical circuit between the rollers 14 and 18 is accompanied by deenergization of relay 23 and opening of the relay controlled contacts 43. The arms 28 and 29 return to their original position under the bias of spring 37 and the cycle repeats itself.

An automatically operable selector switch for use with the apparatus above described is illustrated in Fig. 3. The switch is adapted to be mounted on bracket 25. It comprises a back piece 45 and a shoulder piece 46 adjustably mounted on bracket 25 by means of a bolt and nut 47. U-shaped bracket 48 is fixed to back piece 45 by means of screws 49. Shaft 50 is supported through holes in bracket 48. The ends of the shaft are threaded for receiving nuts to maintain the shaft in a particular longitudinal position. Other means such as a pair of collars having set screws can be used. A collar 51 is secured to shaft 50 intermediate its ends for mounting brush 52 corresponding to the contactor of switch 20 of Fig. 1. An insulating bracket 53 is secured to the U-shaped bracket 48, intermediate its ends. A plurality of

electrically separate commutator sections 54 corresponding to the contacts 19 of Fig. 1 are secured to insulating bracket 53. A ratchet 55 is fixed to shaft 50 and is positioned to be engaged by pawl 56. Spring 57 maintains the pawl in the proper position. Each time that the arm 29 is moved under the action of solenoid 32, the ratchet is rotated one step. Rotation of the ratchet is accompanied by like rotation of brush 52 through shaft 50. The commutator sections are provided with binding posts 58 whereby each of the commutator sections may be connected to any one of the roller binding posts.

The selector switch 20 makes it possible to produce a series of conductive sections on the continuous core according to a predetermined schedule such as a series of long sections, a series of short sections, and a series of medium size sections. The particular choice of number and size of commutator segments will determine the sequence of lengths of wire produced. Vertical adjustment of the selector switch 20 on bracket 25 varies the angle of rotation of the shaft 50 under the action of the pawl 56.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

We claim:

1. Apparatus for automatically producing a series of successive predetermined lengths of conducting material on a continuous length of insulating supporting core from a continuous length of conducting material on a coextensive length of insulating core comprising a pair of high current contacts adapted to pass a fusing current through a small length of said conducting material at predetermined intervals spaced along its length, electrical circuit means, said electrical circuit means arranged to be energized and deenergized under the control of said conductive material for controlling the passage of fusing current through said high current contacts and said conductive material to produce breaks in the continuity of the material at said intervals.

2. Apparatus for producing a series of successive predetermined lengths of electrically conductive material on a supporting core comprising a plurality of selectively energizable rollers, a pair of closely spaced high current contacts and a continually energized roller, a continuous length of wire wound core arranged to pass in engagement with each of said rollers successively but out of engagement with said contacts, a selector switch for connecting one of said plurality of selectively energizable rollers to a power source, a relay in circuit with said selector switch and arranged to be energized when a circuit is completed among the selected energizable roller, the continually energized roller and the wire wound core, a solenoid arranged to be energized under the control of said relay, switch means and lever means controlled by said solenoid for causing engagement between said pair of closely spaced high current contacts and said wire wound core and permitting the passing of a fusing current therethrough to produce a break in the continuity of the wire, the apparatus being so arranged that as the wire wound core is fed therethrough continually, a break in the continuity of the wire is produced at predetermined spaced intervals.

3. Apparatus for producing a series of successive predetermined lengths of electrically conducting material comprising a series of electrically conductive guide members, a continuous insulating core having a conductive wire coextensive therewith adapted to pass in successive engagement with each of said guide members, the first of said series of guide members being connected to one side of a power supply, a selector switch arranged to selectively connect any one of said remaining guide members to the other side of the power supply, a relay in circuit with said selector switch and arranged to be energized when said conducting wire completes a circuit through said first of said series of guide members and said selected one of said remaining guide members, a solenoid adapted to be energized under the control of said relay, a pair of closely adjacent contacts arranged to be engaged with said conducting wire under the action of said solenoid, a switch closed under the control of said solenoid to permit a fusing current to be passed through said conductor by means of said contacts to provide a break in the electrical continuity thereof.

4. Apparatus for use in the production of conductive rope having electrical discontinuities comprising a fixed support, bracket means mounted on said support, a pair of elongated members pivotally mounted one above the other on said bracket means, both of said members being normally parallel to said support, a solenoid mounted on said fixed support, a rod pivotally joined to the core of said solenoid and extending through openings in each of said elongated members and adapted to abut the upper of said members and to move it positively downwardly, a compression spring on said rod extending between said elongated members, a tension spring connected to the fixed support and one end of said lower elongated member, closely spaced contacts mounted on said base adjacent the other end of said lower elongated member, said contacts adapted to be electrically bridged by said conductive rope for passing a fusing current therethrough, a mercury switch mounted on the upper of said members responsive to pivotal motion of said elongated members, a selector switch mounted on said bracket means, a pawl and ratchet operatively associated with said lower elongated member for operating the selector switch, a first conductive guide means, a subsequent series of conductive guide means, the conductive rope comprising a continuous length of conducting material wound on an insulating rope core arranged to engage said guide means in passing through said apparatus, the said selector switch being arranged to connect one of said subsequent conductive guide means to a power supply, a relay in circuit with said selector switch, the first said conductive guide means being permanently connected to the other side of said power supply, whereby said relay is energized whenever said first conductive guide means and the subsequent one selected by the selector switch is bridged by the conductive rope, the said relay when energized being arranged to close the energization circuit of said solenoid.

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