Jan. 26, 1954 G. H. JAYCOX 2,667,204

COILING HEAD ASSEMBLY

Filed March 29, 1952

2 Sheets-Sheet 1

Fig. 1.

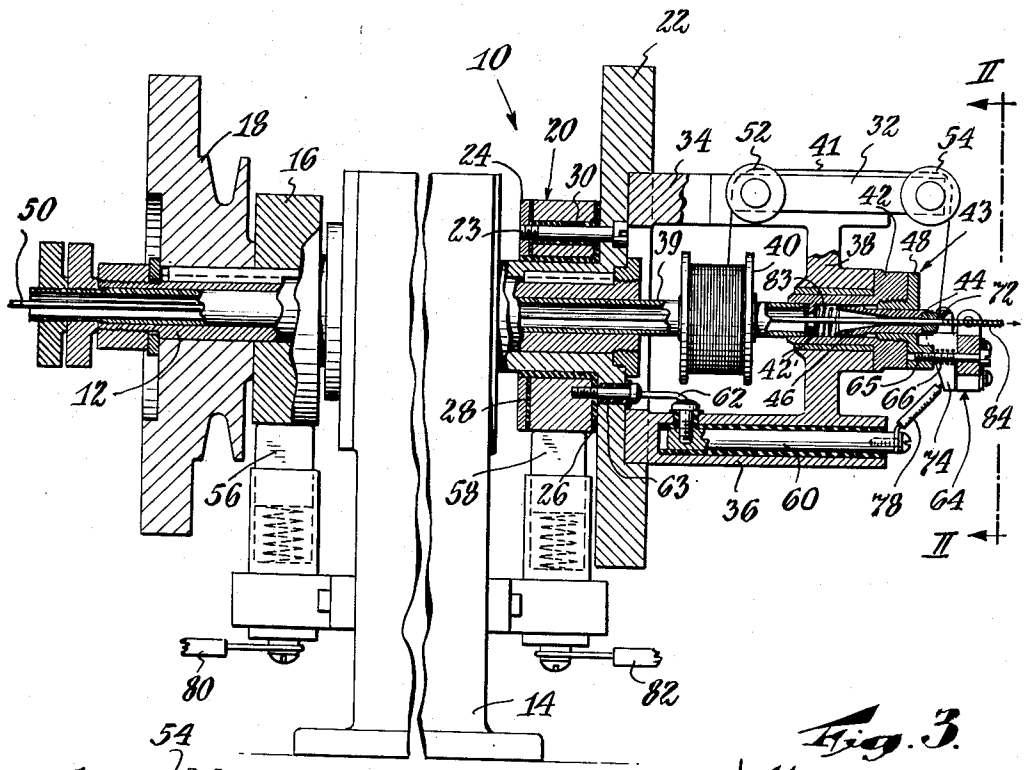



Fig. 2.

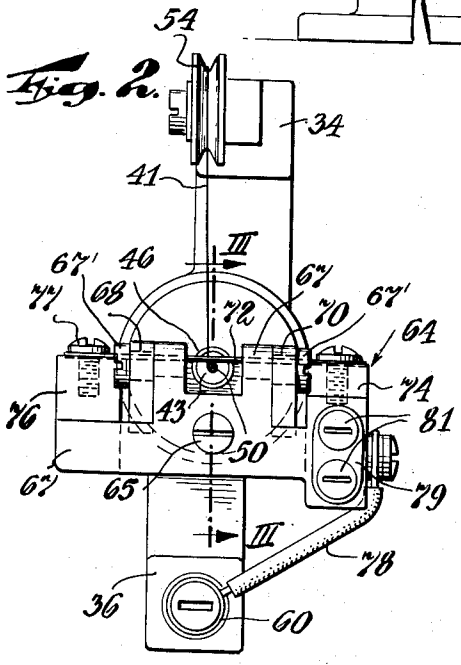
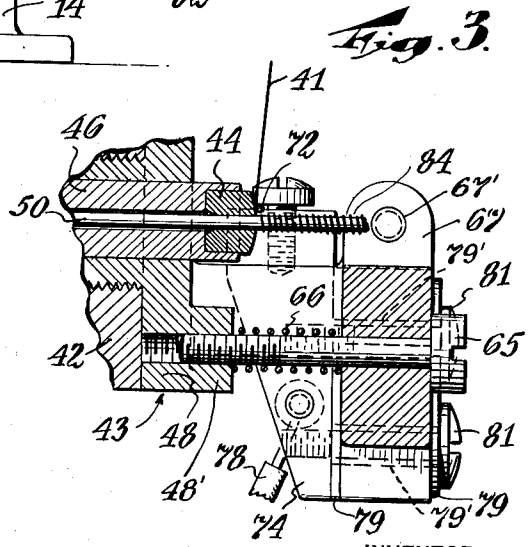



Fig. 3.




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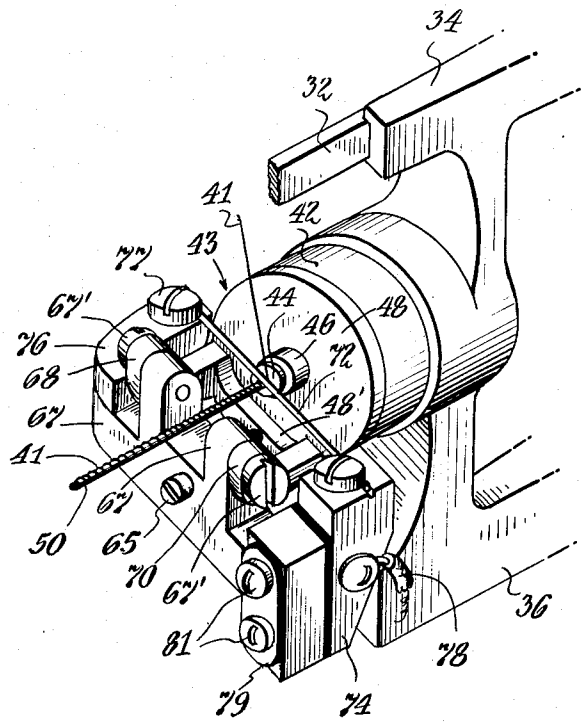
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Fig. 4.




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Patented Jan. 26, 1954

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# UNITED STATES PATENT OFFICE

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## COILING HEAD ASSEMBLY

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Application March 29, 1952, Serial No. 279,307

2 Claims. (Cl. 153—67)

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The present invention relates to a machine for winding primary coils for incandescent lamps and, more particularly, to a bridge pin used and heated for that purpose.

In the past, one of the major problems involved in the high speed winding of coils for incandescent lamps has been the numerous breaks in the wire being wound, due to the fact that the wire was wound while cold. Several methods to avoid this trouble have been employed, including the use of a small gas flame impinging on the wire at the point of winding, and a hot air heater supplying a directed stream of heated air to the wire at the point of winding. Because of the great air turbulence caused by the rotating head of the coil-winding machine, revolving at 8000 R. P. M., neither of the above mentioned methods are effective. Again, an electric current was passed through the wire itself to pre-heat it before winding. However, this method did not provide uniform heat in the wire because the low tension thereon does not provide a good electrical contact.

Hence, it has been found advantageous, according to my invention, to provide a coil-winding machine with an electrically heated bridge pin for heating the wire (to be wound) by conduction, before winding said wire on the primary mandrel. The bridge pin of my invention is electrically heated by a current which is picked up by the slip rings on the rotating head of the coil-winding machine and it also adjusts and controls the winding of the coil. A compression spring in back of the mandrel die holds the filament wire against the heated bridge pin at the point of winding so that the heat from the pin is transmitted to the filament wire to be wound by conduction and radiation at the point of winding.

In its general aspect, the present invention has as its objective the avoidance of the defects of the prior art methods and apparatus for heating the filament wire to be wound on a coil-winding machine.

Another object is an electrically heated bridge pin for a coil-winding machine which transmits heat to the filament wire by conduction and radiation at the point of winding.

A further object is an electrically heated bridge pin for a coil-winding machine which reduces wire rejections to an absolute minimum, increases coil-winding efficiency, and decreases filament coil shrinkage.

Other objects and advantages of the invention will become apparent to those skilled in the art to which it pertains as the description proceeds.

Referring to the accompanying drawings, in which like numerals of reference designate similar parts throughout the several views:

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Fig. 1 is a vertical sectional view, with parts in elevation, of a coiling-head assembly of a coil-winding machine embodying my invention;

Fig. 2 is an enlarged end elevational view of the coiling-head assembly of Fig. 1, in the direction of the arrows on the line II—II of Fig. 1;

Fig. 3 is a detailed sectional view of the mandrel and electrically heated bridge pin of my invention, on the line III—III of Fig. 2, in the direction of the arrows;

Fig. 4 is a perspective view of the electrically heated bridge pin.

Referring to the drawing, and more particularly to Fig. 1, a coiling-head assembly is designated by the reference numeral 10. This assembly has a hollow coiling head shaft or spindle 12 which rotates in a suitable bushing in a pedestal 14. On one end of the shaft 12, suitably near the pedestal, a collector ring 16 and a means for rotating said shaft, such as a spindle pulley 18, are keyed to the shaft and held thereon as by suitable nuts. Adjacent the other side of the pedestal, a second collector ring 20 is suitably affixed against a spindle fly wheel 22 by a bolt 23, which threads into a retaining plate 24. The fly wheel 22 is similarly keyed to the shaft 12. An appropriate bushing 26, a washer 28, and a screw bushing 30 of insulating material insulate the commutator 20 from the retaining plate 24 and the spindle fly wheel 22.

This fly wheel 22 is provided with an axially-extending yoke 32, of a general H-like configuration, and having axially-extending wire guide arm 34, terminal post tubing arm 36, and a radially-extending center portion 38. On a bobbin shaft or spindle 39 keyed to the shaft 12 and between the fly wheel 22 and the center portion 38 of the yoke 32, is a wire spool 40, carrying filament wire 41. On the wire guide extension arm 34 of the yoke 32, two rotatable wire guide rollers 52 and 54 are provided for said filament wire 41.

The right hand end of the spindle 39, when viewed in Fig. 1, is slidable or retractable for replacing a bobbin 40 in a stationary center portion 42 which is affixed to the center portion 38 of the yoke 32 and is employed for affixing thereto a die holder assembly 43. The center portion 42 has an annular abutment portion 42' for compressing a die holder spring as hereinafter explained. This assembly 43 comprises a die 44, suitably non-conducting sapphire, and a die holder 46, suitably attached, as by threading, to the center portion 42 by a coiling head nose 48. This nose 48 has a lower center lug 48' provided with a threaded hole for adjustably mounting a bridge pin assembly of my invention as hereinafter explained. A non-rotatable mandrel 50 axially extending beyond the length of the coiling

head shaft 12, is laterally reciprocable through the die holder 46 and the die 44 by means (not shown).

Two brushes 56 and 58 mounted by means of suitable brackets from the pedestal 14 are in slidable engagement with the collector rings 16 and 20, respectively. Within the terminal post tubing arm 36, a terminal post 60, suitably insulated therefrom, (as by an insulating sleeve) is secured therein by means of an insulated contact bolt, and connected by a lead 62 to a second contact bolt which threads into the commutator 20, and is appropriately insulated by means of a bushing 63 from the spindle fly wheel 22.

Referring now to Figs. 2 and 3, the bridge pin assembly 64, of my invention, comprises a bridge pin holder 67, pivotally mounted by means of bolts 67' on a pair of generally L-shaped extension arms 68 and 70 projecting from said coiling head nose with their normally elongated sides horizontal, a bridge pin 72, and a bridge pin support 74 insulated from and carried by the holder 67. A bolt 65 extends through a clearance hole in the holder 67 to permit slight pivotable movement of the holder 67 and threads into the lug 48' on the nose 48. A spring 66 on the bolt 65 extends between the lug 48' and the holder 67. As shown in Fig. 2, one end of the bridge pin 72 is secured in a laterally extending groove in the upper surface of a side extension 76 of the holder 67 by a suitable screw 77. The other end of said pin is similarly secured in the bridge pin support 74, which is similar in shape to extension 76 and suitably insulated from the bridge pin holder 67 by means of mica-washers 79. The support 74 is held thereto by means of a pair of screws 81, also suitably insulated by mica-bushings 79' from the body of the bridge pin holder 67. A lead 78 connects the bridge pin support 74 to the terminal post 60 of the terminal post tubing 36. It will be understood that the bridge pin holder is suitably pivoted on the extension arms 68 and 70, to allow for employment of the bridge pin 72 with a large assortment of mandrel sizes. The bridge pin is disposed above, close to, but not in contact with said mandrel 50. Wire 41 from the spool is fed over the wire guide rollers 52 and 54 into contact with the bridge pin 72 and thence into engagement with the mandrel. A compression spring 83 between die holder 46 and the abutment portion 42' of the center portion 42 pushes the die holder 46 and the non-conducting die 44 forward against the wire 41, thus pressing the wire 41 against the bridge pin 72.

Current is supplied from a lead 80 through the brush 56 and the collector ring 16, along the shaft 12 through the fly wheel 22, wire guide extension arm 34, die holder assembly 42, bridge pin holder 67, and thence to the left end of the bridge pin 72 (when viewed in Fig. 2). A lead-in conductor 82 connects the other side of the power supply line to the other brush 58 and the collector ring 20 through lead 62, terminal post 60, and lead 78 to the bridge pin holder support 74 and the other side of the bridge pin 72, thus completing the circuit and permitting the resistance heating of the bridge pin.

According to my invention, one end of the wire 41 is affixed to the mandrel 50 and the wire 41 is maintained in contact with the electrically-heated bridge pin 72 by the springs 66 and 83. As the coiling head assembly 10 rotates at a high speed, in the neighborhood of 8000 R. P. M., a



coil 84 is wound on the mandrel 50 which simultaneously moves through the die 44 of the die holder assembly 43. By heating the wire 41, immediately prior to winding, and the mandrel 50 adjacent to the bridge pin 72 by conduction and radiation from the bridge pin 72, the coil 84 is wound on said mandrel while sufficiently heated to avoid breakage.

Thus it will be seen from the foregoing description that the present invention has provided a bridge pin assembly 64 for a coiling head assembly 10 of a coiling machine which eliminates the defects and disadvantages of the prior art methods and apparatus for heating the filamentary wire 41 immediately prior to winding. I have provided an electrically-heated bridge pin 72 which transmits heat to the filament wire 41 and to the mandrel 50, by conduction and radiation at the point of winding. This electrically-heated bridge pin reduces wire rejections to an absolute minimum, increases efficiency, and decreases filament coil shrinkage. The compression spring 83 in back of the die holder 46 and the spring 66 on the adjustment bolt 65 of the holder 67 automatically maintain the filament wire 41 against the bridge pin 72 at the point of winding.

Although an embodiment of my invention has been disclosed, it will be understood that modifications may occur to those skilled in the art.

I claim:

1. In combination a coiling head assembly for providing one side of a bridge pin assembly supply circuit comprising at least a coiling head spindle, a collector ring and a fly-wheel on said spindle, a wire guide extension arm on said fly-wheel, a die holder assembly on said extension arm and the other side of said circuit comprising a second collector ring on and insulated from said spindle and means for connecting said second ring to a bridge pin assembly, and an electrically heated bridge pin assembly on said die holder assembly.

2. In combination a coiling head assembly for providing one side of a bridge pin assembly supply circuit comprising at least a coiling head spindle, a collector ring and a fly-wheel on said spindle, a wire guide extension arm on said fly-wheel, a die holder assembly on said extension arm and the other side of said circuit comprising a second collector ring on and insulated from said spindle and means for connecting said second ring to a bridge pin assembly, and an electrically heated bridge pin assembly on said die holder assembly, said bridge pin assembly comprising a pivoted bridge pin holder, a bridge pin support on said holder and insulated therefrom and a bridge pin extending between said holder and said support.

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