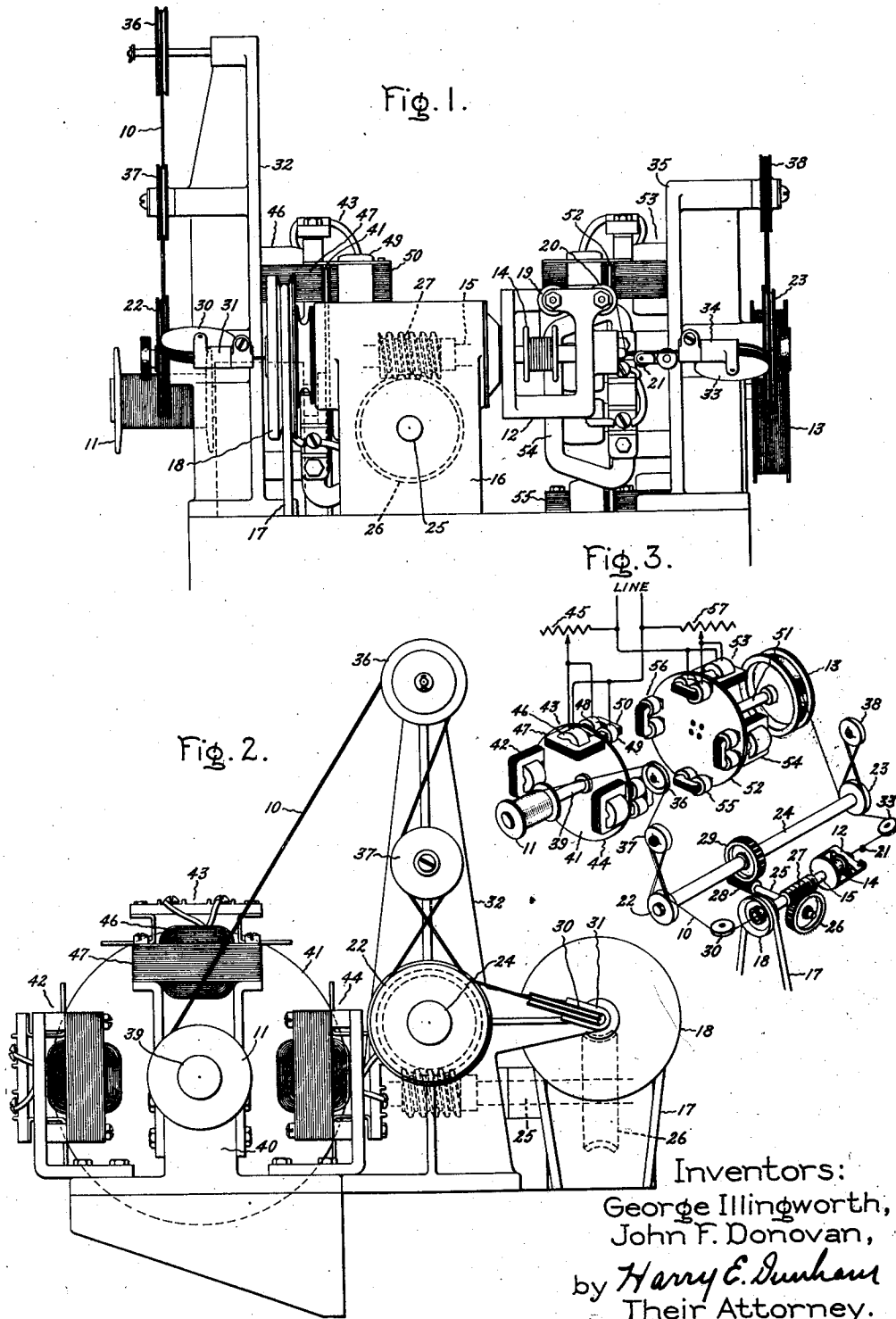


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MACHINE FOR COILING FILAMENTS

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MACHINE FOR COILING FILAMENTS

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Our invention relates to machines for coiling wire and more particularly to machines in which a fine wire such as used for incandescent lamp filaments is coiled on a mandrel. One difficulty with prior machines has been that the relative movement of mandrel and coiling head has not been uniform and variations in the pitch of the coils has resulted. Such defects in the filament cause the development of hot spots in the filament when in use. The object of our invention is to provide an apparatus in which a much more uniform relation than heretofore is maintained between the movement of the mandrel and coiling head.

In one type of coiling machine the mechanism for coiling the filament about the mandrel consists of a head which is rotated by a motor driven belt and through which the mandrel wire extends. The mandrel is moved longitudinally by a pair of drums located at opposite sides of the head, one of which takes the mandrel from one spool and the other of which delivers the mandrel carrying the coiled filament to the other spool. The said drums are driven through gearing by the same shaft which drives the filament coiling head. Any play in the said gearing obviously will cause variations in the rate of travel of the mandrel and produce non-uniformity in the spacing of the filament coils. Heretofore friction devices have been employed to exert tension on the mandrel at the supply and wind-up positions. These have proven inadequate for various reasons among which are that there is variation in the coefficient of friction due for instance to temperature changes, lubrication, etc. According to our invention, we provide means for producing uniform tension in the mandrel at the supply and wind-up positions which comprises a pair of low power electric motors, each of which is connected to a spool on which the mandrel is carried. In one instance the motor tends to turn the spool in the opposite direction from which it turns as the mandrel is drawn therefrom and in the other instance the motor turns the spool so that the mandrel on which the wire is coiled is wound up. The uniform tension provided by the motors eliminates the detrimental action of the play in the drive gearing since a constant pressure is thus applied to this apparatus and its parts preserve a constant relation to each other. Other features and advantages of our invention will be apparent from the drawing and description which follows of one species thereof.

In the drawing, Figs. 1 and 2 are side and end elevations respectively of a lamp filament coiling

machine of our invention; and Fig. 3 is a diagrammatic perspective view of the essential parts thereof.

In the machine shown, the mandrel wire 10 passes from the spool 11 on the left end of the machine through the coiling head 12 and onto the spool 13 at the right end thereof. The filament wire which is coiled about the mandrel wire is carried by spool 14 which is supported by the coiling head 12. The coiling head is of conventional design and is attached to shaft 15 which is supported on bearings in block 16 and is driven from a source (not shown) through belt 17 and pulley 18. The spool 14 is rotatably mounted on a portion of shaft 15 and the filament wire therefrom passes over rollers 19 and 20 in turn and is then coiled upon the mandrel wire 10 as it travels beyond the end of the said shaft. The composite coil and mandrel wire thus produced is engaged at a point just beyond the coiling head by a roller 21 which prevents its vibration.

The pitch of the filament coil is governed by the rate of movement of the mandrel wire. This movement is produced through driven measuring drums 22 and 23 on the opposite ends of shaft 24. Shaft 24 is driven from shaft 15 by the jack shaft 25 which is provided with a worm gear wheel 26 which engages worm gear 27 on shaft 15 and which is provided with a worm gear 28 which engages worm gear wheel 29 on shaft 24. The wire 10 is directed into the end of hollow shaft 15 on passing from drum 22 by pulley 30 which is mounted on the bracket 31 carried by standard 32. The mandrel wire 10 on which the filament wire has been coiled is directed to drum 23 by pulley 33 which is mounted on the bracket 34 carried by standard 35. Between spools 11—13 and drums 22—23 the mandrel wire takes a circuitous path provided mainly to cause more turns of the mandrel wire to contact with the feeding drums 22—23 and thus to insure more positive control of its movement. The wire leaving the spool 11 passes over spool 36, along one side of pulley 37, down under drum 22 and then up over pulley 37 and down under drum 22, twice after which it passes nearly completely around drum 22 and then partially around pulley 30. The wire passed to drum 23 is first threaded down under the drum, then up and over the opposite side of pulley 38 and down under the drum twice in the form of a double figure eight, and then passes off the drum to spool 13.

The spool 11 is driven by an induction motor of such low power that its rotor is normally turned backwards as the wire is unreeled from the spool

by the rotation of drum 22. The spool 13 is driven by a similar motor but there is of course no tendency for this to be reversed. In this manner both ends of the mandrel wire are kept taut and under constant tension regardless of speed. Spool 11 is removably mounted on shaft 39 which is supported by block 40 and attached to the disc or rotor 41 of the induction motor. The rotor 41 is preferably made of copper and the motor has three induction coil assemblies located at 42, 43, and 44. The top coil assembly is shown wired through rheostat 45 to the line and the other coil assemblies are also connected through the rheostat to the line but the connections are not shown. Each coil assembly comprises a single coil 46 with a core 47 extending through and about it with the ends thereof adjacent the face of the disc 41 and a pair of coils 48 and 49 connected in series to the line and mounted on legs of core 50, the ends of which are adjacent the other face of the disc 41. Spool 13 is removably mounted on shaft 51 to which the disc or rotor 52 of the induction motor is fastened. Four induction coil assemblies, 53, 54, 55 and 56, are provided in this case since the pull thereof must overcome the reverse pull of the other motor. These coil assemblies are each connected through rheostat 57 like the single coil assembly shown. The required amount of tension for all conditions may be produced by adjusting the rheostats 45 and 57.

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

1. In a machine for coiling a filament about a mandrel wire, the combination of a shaft for receiving a spool holding a quantity of mandrel wire, means for unwinding the mandrel wire from said spool and for coiling a filament thereabout, means for maintaining a uniform tension on the mandrel wire which comes from said spool comprising means tending to rotate said shaft in the opposite direction from the rotation caused by the unwinding of said mandrel wire, and means for winding up the mandrel wire after the coiling operation.

2. In a machine for coiling a filament about a mandrel wire, the combination of a shaft for receiving a spool holding a quantity of mandrel wire, means for unwinding the mandrel wire from said spool and for coiling a filament thereabout, means for maintaining a uniform tension on the mandrel wire which comes from said spool comprising an electric motor having a rotor attached directly to and tending to rotate said shaft in the opposite direction from the rotation caused by the unwinding of said mandrel wire and means for winding up the mandrel wire after the coiling operation.

3. In a machine for coiling a filament about a mandrel wire, the combination of a shaft for receiving a spool holding a quantity of mandrel wire, means for unwinding the mandrel wire from said spool and for coiling a filament thereabout, means for maintaining a uniform tension on the mandrel wire which comes from said spool comprising an electric motor having a rotor attached directly to and tending to rotate said shaft in the opposite direction from the rotation caused by the

unwinding of said mandrel wire, a second shaft for receiving a spool upon which the mandrel wire carrying the coiled filament is wound and means for winding up and maintaining a uniform tension on the said mandrel wire comprising an electric motor having a rotor attached directly to said shaft.

4. In a machine for coiling a filament about a mandrel wire, the combination of a shaft for receiving a spool holding a quantity of mandrel wire, a drum located adjacent thereto about which a turn of said mandrel wire is wound, means for maintaining a uniform tension on the mandrel wire which comes from said spool comprising means tending to rotate said shaft in the opposite direction from the rotation caused by the unwinding of said mandrel wire, means located adjacent said drum for coiling a filament about the mandrel wire passed off said drum, a second drum about which a portion of said mandrel wire is wound, means for rotating said drums to move said mandrel wire longitudinally and means for winding up the mandrel wire carrying the coiled filament.

5. In a machine for coiling a filament about a mandrel wire, the combination of a shaft for receiving a spool holding a quantity of mandrel wire, a drum located adjacent thereto about which a turn of said mandrel wire is wound, means for maintaining a uniform tension on the mandrel wire coming from said spool comprising an electric motor having a rotor attached directly to said shaft and tending to rotate it in a direction to wind up said mandrel wire, means located adjacent said drum for coiling a filament about the mandrel wire passed off said drum, a second drum about which a portion of said mandrel wire is wound, means for rotating said drums to move said mandrel wire longitudinally and means for winding up the mandrel wire carrying the coiled filament.

6. In a machine for coiling a filament about a mandrel wire, the combination of a shaft for receiving a spool holding a quantity of mandrel wire, a drum located adjacent thereto about which a turn of said mandrel wire is wound, means for maintaining a uniform tension on the mandrel wire which comes from said spool comprising an electric motor having a rotor attached to said shaft and tending to rotate it in a direction to wind up said mandrel wire, means located adjacent said drum for coiling a filament about the mandrel wire passed off said drum, a second drum located adjacent said coiling means about which a turn of said mandrel wire carrying the coiled filament is wound, means for rotating said drums to move said mandrel wire longitudinally, a second shaft for receiving a spool upon which the mandrel wire carrying the coiled filament is wound and means for winding up and maintaining a uniform tension on the said mandrel wire comprising an electric motor having a rotor attached to said second shaft, said second-mentioned electric motor being of sufficient size to overpower said first-mentioned electric motor.

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