Aug. 14, 1928.

S. WADSTEN

1,680,489

ADJUSTABLE MEASURING AND CUTTING DEVICE FOR COIL WINDING MACHINES

Filed Feb. 4, 1927

2 Sheets-Sheet 1

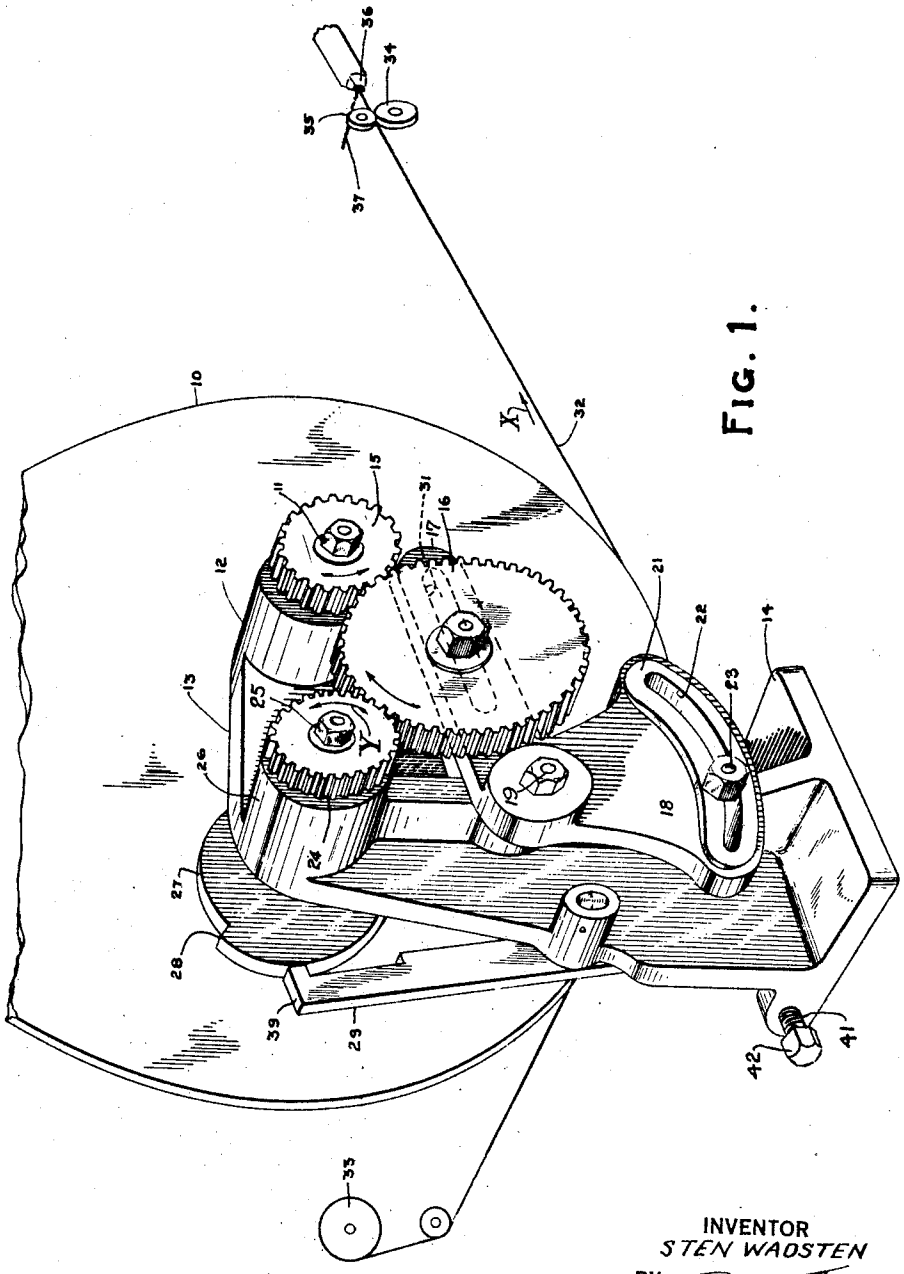


FIG. 1.

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FIG. 2.

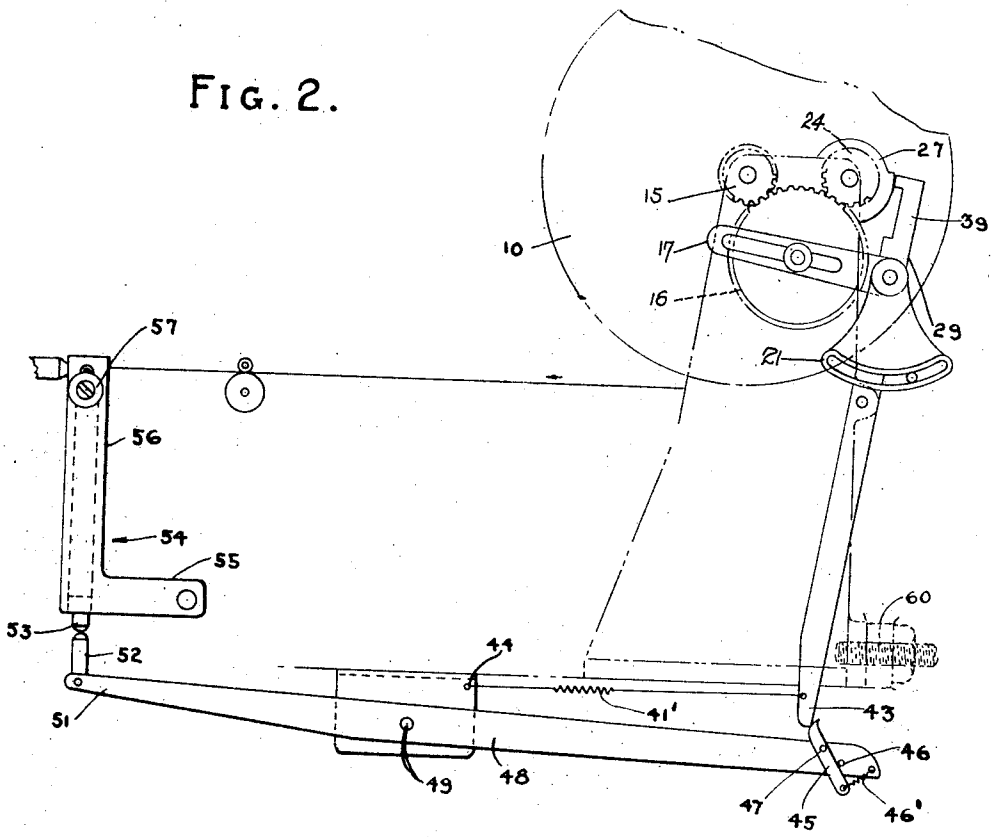
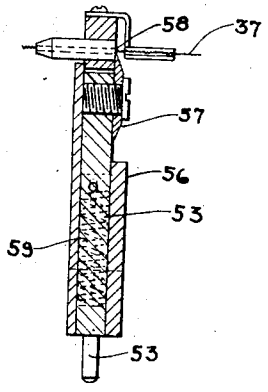


FIG. 3.



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UNITED STATES PATENT OFFICE.

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ADJUSTABLE MEASURING AND CUTTING DEVICE FOR COIL-WINDING MACHINES.

Application filed February 4, 1927. Serial No. 165,857.

This invention relates to improvements in machines for coiling filament wire and more particularly to a machine of such type operating in the absence of a mandrel as shown and described in co-pending application Serial No. 121,156, filed July 8, 1926, and assigned to the same assignee as is the present invention.

The machine disclosed in the said co-pending application above referred to provides for the coiling of a fine filamentary wire to produce a helical body capable of use as an incandescent electric lamp filament. In the operation of the said machine a wire is fed endwise into a cavity die from which it emerges in a series of successive convolutions. The coiling operation is continuous and a filamentary body of indefinite length may be produced.

An important step in the manufacture of coiled lamp filaments, however, consists in producing sections of coiled wire of a predetermined and uniform length. In the above mentioned application, mechanism is shown and described for producing coiled sections containing given lengths of wire and means are also provided for controlling the amount or length of wire in each section so that a multiplicity of sections of exactly the same length may be produced so that the section will contain uniform lengths of wire so as to produce filaments of uniform given electrical resistance.

This is accomplished by providing the said machine with a measuring wheel or drum around which the filament or wire passes several times on its way to the die for the coiling operation. The drum is so arranged that upon a complete revolution thereof, mechanism is operated to sever a section of coiled wire, the said section containing a length of wire equal to the circumference of the drum. From this it will be evident that a machine may be provided with a drum for producing coiled sections of a given length. The sections thus produced obviously contain lengths of wire useful in lamps of a given rating, that is, the lamp filament for a 60 watt, 115 volt lamp must contain a length of wire of 517 mm. and in accordance with the operation of the machine. If a lamp filament of another wattage is desired, it is evident that the rating data will vary and the length of the amount of wire in the coiled section will differ. Under these conditions, it has heretofore been necessary to substitute another measuring drum of the proper circumference to accommodate the variation in the rating data.

An object of the present invention is, therefore, to facilitate the adjustment of a coil winding machine for the production of coiled sections containing different lengths of wire.

A further object of the invention is to provide a coil winding machine with coordinating machine elements so arranged as to be expeditiously adjusted to quickly and conveniently adapt the machine for the production of coiled sections of different lengths.

Other objects and advantages of the invention will be understood as the description proceeds.

In the attainment of the desired result, a coil winding machine may be provided with a drum or measuring wheel of a given diameter. The wheel may be rotated by frictional engagement with a bight of the moving wire so that a movement of the wire about the periphery of the wheel may be utilized and so applied that upon a given travel of a predetermined point in the wire, means will operate to sever the wire. In some cases, it may be desirable to sever a length of filament equal to a given portion of the circumference of the wheel and for this purpose mechanism is so arranged that upon a given movement of a point in the periphery of the measuring wheel, means are brought into operation to sever a wire. In accomplishing this result, the measuring wheel is provided with means for transmitting movement to a cutter actuating member upon any predetermined degree of movement of the measuring wheel. This means may comprise a pinion rotatable with the measuring wheel and adapted to engage with an intermediate or idler gear wheel in mesh with a pinion rotatable with a cam member which actuates the wire cutting mechanism. By reason of this gear train motion transmitting means, it is possible to actuate the cam upon any given relation to the degree of movement of the measuring wheel and to cause the actuation of the cam with respect

to the degree of movement of the said measuring wheel. This relation may be changed by a change in the ratio between the said gears.

The invention will be more fully understood by reference to the accompanying drawing in which:

Fig. 1 is a perspective view of the present cutter actuating mechanism;

Fig. 2 is a diagrammatic or skeleton view of the cutter actuating elements showing the motion transmitting means between the cutter and said elements; and

Fig. 3 is a vertical sectional view showing the cutting device.

The present invention as illustrated, is applied to a coil winding machine as shown in the above mentioned co-pending application and may comprise a measuring wheel 10 secured to one end of and rotatable with a shaft 11, journaled in a bearing 12 of a bearing bracket 13. The bearing bracket may be provided with a foot 14 for attachment to a table or suitable supporting structure. The opposite end of the shaft 11 may be provided with a pinion 15 disposed for engagement with a gear wheel 16 constituting an idler, carried upon an arm 17 of a rockable-member 18 pivoted at 19 on the bracket 13.

The member 18 may be provided with a depending arm 21 having an arcuate slot 22 through which a stud 23 fastened in the bracket 13, extends, the stud being provided with a suitable nut to lock the arm and consequently the rockable-member 18 in a given position.

A rotation of the measuring wheel 10 will obviously cause a rotation of the gear wheel 16 which latter may be disposed in mesh with a pinion 24 secured to one end of a shaft 25, journaled in a bearing 26 integral with the bracket 13. The opposite end of the shaft 25 may be provided with a cam 27 so that a rotation of the pinion 24 causes a rotation of the cam. This cam member is provided with a drop portion 28 and is engageable with a lever arm 29 which actuates cutting mechanism to be presently described.

A rotation of the measuring wheel 10 in the direction of the arrow X will result in the transmission of motion through the gearing 15, 16 and 24 to rotate the cam 27 in the direction of the arrow Y to actuate the lever 29 which in turn transmits motion to wire severing mechanism. It will be evident that the drop portion 28 of the cam 27 will be moved to actuate the lever 29 upon a given degree of rotation of the measuring wheel 10 according to the ratio between the gears 15 and 24 as will be hereinafter more fully explained.

If it is desirable to actuate the cutting mechanism to sever sections of wire of a given length, the gear wheel 24 may be removed and another substituted therefor of a different pitch diameter. This may be readily accomplished since the idler gear wheel 16 is mounted on the rockable arm 18 and may be oscillated to or from engagement with the pinions associated with the measuring drum and the cam in addition to the oscillatory movement of the idler 16 the same is movable along the arm by reason of a slot 31.

In the type of machine to which the present invention is applied, a wire 32 may be lead from a spool or other source of supply 33, thence around the drum 10 and between driving rollers 34 and 35. The driving rollers are rotated by a suitable source of power (not shown), such mechanism being fully set forth in the above mentioned co-pending application. After passing between the driving rollers, the wire is directed into a die 36 from which it issues in the form of a coil 37 which is subsequently severed into sections of a given length for use as a lamp filament.

In the making of this lamp filament, it is necessary that each filament length be cut to a given dimension, for example, in order to produce a coiled filament for a 60 watt lamp, it is necessary to employ a wire having a diameter of .00187 inch and to coil the wire into a helix containing 398 turns per inch and severed coiled filaments must each contain a length of wire of 517 mm. so as to afford the required electrical resistance. Ordinarily a machine for winding these coiled filamentary sections may be supplied with a drum having a diameter exactly equal to the length of the filament wire in a coiled section, such section being severed upon a complete rotation of the drum.

In the manufacture of incandescent lamps, however, there are many types of lamps, that is, the wattage varies and the different types require coiled sections of different lengths. In changing from one wattage to another, it was, therefore, necessary to change the measuring wheel or drum and inasmuch as the variety of lamps is extensive, it was of some inconvenience to provide the necessary number of different diameter wheels. Furthermore, in some types of lamps, the coiled section is of such a length as to require a drum of an exceptionally large size, thus making it impossible without considerable modification and adjustment to provide a drum for measuring such a filament section. In addition to the adjustment, it will be obvious that when changing the drum the line of travel of the filament from the drum to the coiling die will be changed and adjustment is often necessary in this portion of the mechanism.

In the present invention the employment of indirect transmission of motion from the

measuring drum to the cutting mechanism makes it possible to greatly reduce the number of drums required. For example, a drum for a given wattage lamp may be employed and the gear wheel 24 may be changed so as to so actuate the cam 27 that a section of filament will be severed of a given length, then without changing the drum, another gear may be substituted to produce a filament section of another length.

It may be stated that the length of filament in a coiled section is to the diameter of the drum 10 as the pitch diameter of gear wheel 15 is to gear wheel 24. If for instance a drum of 600 mm. diameter is employed and a filament length of 100 mm. is required then gears 24 and 15 may have 22 and 132 teeth respectively. If the gears are reversed, then the opposite condition will occur that is, a filament length of 3600 mm. may be produced.

It will thus be evident that by variation in the ratio of the pitch diameters of the gears, the lengths of the severed coiled sections may be varied. The accuracy attained is, however, not dependent upon a secondary transmission of motion since the prime mover of the drum is the wire to be measured and the present mechanism utilizes a movement of a portion of the wire a predetermined distance in combination with mechanism to sever wire into uniform lengths in accordance with the wattage of the particular type of lamp for which the filament is to be used.

The mechanism for severing the coiled sections may be the same as that shown in the co-pending application and as illustrated in Fig. 2 includes the lever 29 pivoted at 38, an end 39 of this arm is normally held against the cam 27. A spring 41′ and set screw 42 being provided to regulate the degree of movement of the arm. The spring 41 may have one end secured to the lower end 43 of the lever 29 and the opposite end secured to a bracket integral with a stationary portion of the machine. The lever 29 when actuated by the cam 27 engages with a trigger-member 45 normally held against a stop pin 46 by a spring 46′ and pivoted at 47 on one end of a lever 48 which is pivoted at 49 in the bracket 44. An end 51 of the lever 48 is provided with a projection 52 engageable with a slide-bar 53 of a coil severing device 54. This device may consist of an L-shaped member 55 suitably secured to the machine, one arm 56 thereof may be in the form of a casing or guide for the slide-bar 53 (see Fig. 3). This slide-bar carries a cutter member 57 movable across an aperture 58 at the upper end of the arm 56 through which the coiled wire 37 passes after leaving the die 36. The edge of the aperture 58 in conjunction with the cutter 57 serves to sever the coiled wire upon a movement of the cutter. The cutter 57 is normally maintained in its lower position by a spring 59 and operates to sever a coiled section when motion is transmitted thereto from the lever 48. When the cam 27 is rotated, the end 39 of the lever 29 drops and the end 43 thereof is moved outwardly causing the trigger-member 45 to move and permit the said end to pass. When the drop portion 28 permits the end 39 of the lever 29 to return toward the cam, the end 43 of said lever engages the trigger-member 45, which is relatively immovable by reason of the stop pin 46, causing a downward movement of the adjacent lever 48 with the result that the end 51 thereof moves upwardly to actuate the slide-bar 53 and sever a coiled section. This operation is, of course, repeated with each rotation of the cam.

For the purpose of preventing the end 39 of the lever 29 from imposing a severe impact upon the cam 27, a set screw 60 is provided to engage with the end 43 of the lever 29. This set screw serves to prevent wear which would operate to change the stroke and cause a variation in the length of the severed coil. This is particularly true when an anti-friction roller is employed at the end 39 of the lever 29 since if a flat portion were produced upon the roller, the drop may occur prematurely.

The present invention, therefore, makes it possible to produce coiled filamentary bodies of different lengths without alteration to the coil winding machine other than the convenient replacement and adjustment of the motion transmitting elements.

Although a preferred embodiment of the invention is shown and described herein, it is to be understood that modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. A machine for producing coiled filaments for incandescent electric lamps of different wattages comprising means for feeding a wire, a measuring drum movable through contact with said wire, means for coiling the wire after passing said drum, a cutter disposed in operable relation with said coiled wire, means associated with said drum for actuating the cutter upon a predetermined movement of said drum to sever a coiled filament for a given wattage and means for changing the relative movement between said cutter and drum to cut a coiled filament for a different wattage lamp.

2. A machine for producing coiled filaments for incandescent electric lamps of different wattages comprising means for feeding a wire, a measuring drum movable through frictional engagement with said moving wire, means for coiling the wire

passing from said drum, a cutter for severing said coiled wire, a lever for actuating said cutter, a cam member disposed in operable relation to said lever, a gear wheel for rotating said cam, another gear wheel rotatable with said drum and means for transferring motion from one gear to another to actuate said cam upon a predetermined movement of said drum.

3. A machine for producing coiled filaments for incandescent electric lamps of different wattages comprising means for feeding a wire, a measuring drum movable through frictional engagement with said moving wire, means for coiling the wire passing from said drum, a cutter for severing said coiled wire, a lever for actuating said cutter, a cam member disposed in operable relation to said lever, a gear wheel for rotating said cam, another gear wheel rotatable with said drum, an idler gear for transferring motion from one gear to another, said first mentioned gears being interchangeable to cause variation between the operation of the said lever and the movement of the drum to cut coils for lamps of different wattage.

4. A machine for producing coiled filaments for incandescent lamps of given wattages comprising means for moving a wire, a drum movable through engagement with said wire, a wire cutter, means for actuating said cutter upon a given degree of movement of said drum, means for coiling said wire and means for adjusting the time relation between the actuation of said cutter and the movement of said drum to sever a section of coiled filament for a lamp of a given wattage.

5. A machine for producing coiled filaments for incandescent lamps of different wattages comprising means for moving a wire, means for coiling said wire to helical form, a wire cutter and means for actuating said cutter upon a predetermined degree of movement of said wire and means for adjusting said second mentioned means to actuate said cutter upon a different degree of movement of said wire.

6. A machine for producing coiled filaments for incandescent lamps of different wattages comprising means for moving a wire, means for coiling said wire to helical form, a coil severing device, means actuated by said moving wire for operating said coil severing device and means for adjusting said last mentioned means to actuate said severing device upon a different degree of movement of said wire.

In testimony whereof, I have hereunto subscribed my name this 3rd day of February, 1927.

STEN WADSTEN.