May 3, 1927. 1,627,213

D. STONE

WINDING MACHINE

Filed March 25, 1922

Fig. 1.

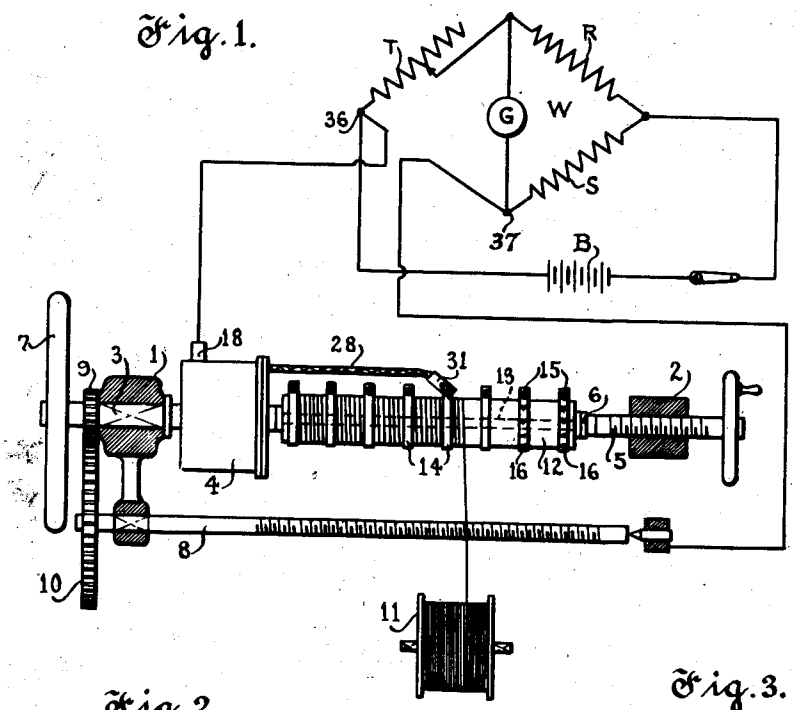


Fig. 2.

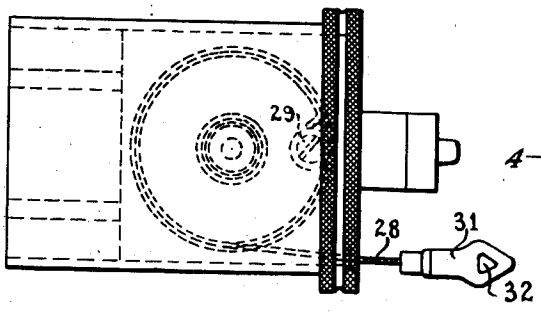


Fig. 3.

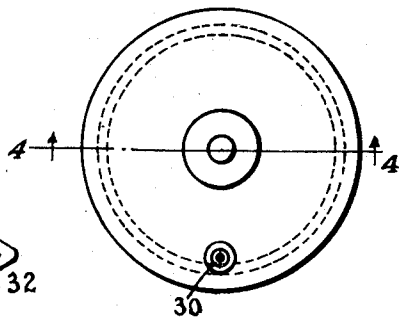
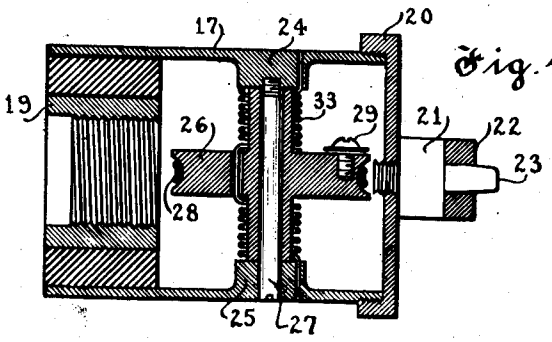


Fig. 4.



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UNITED STATES PATENT OFFICE.

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WINDING MACHINE.

Application filed March 25, 1922. Serial No. 546,922.

This invention relates to winding machines and while not limited thereto is particularly applicable to machines for winding sectional resistance units of the type disclosed in my Patent No. 1,445,919, dated February 20, 1923.

The aforesaid patent discloses a sectional resistance unit having spaced terminal bands thereon so constructed that the resistance wire can be connected thereto in a manner to maintan the ohmic value of the resistance sections within limits whose difference is less than the individual turns of the resistor. In manufacturing such units it has been found impractical to first wind the unit in the usual manner with approximately the correct number of turns thereon and thereafter adjust the number of turns in the individual sections to obtain the correct resistance values.

The present invention has among its objects to provide a winding machine wherein provision is made for determining the resistance value of the individual sections during winding of the unit.

Another object is to provide a winding machine having a chuck associated therewith which provides for connection of the individual sections to a resistance determining device during winding of the unit.

Another object is to provide a simple, rugged and durable chuck of the aforesaid character adapted to maintain proper electrical connections between the resistance determining device and the resistance unit during winding of the latter.

Various other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates an embodiment of the invention which will now be described, it being understood that the embodiment illustrated is susceptible of modification without departing from the scope of the appended claims.

In the drawing,

Figure 1 is a schematic view of apparatus embodying the invention;

Fig. 2 is a side elevational view of a chuck shown in Fig. 1;

Fig. 3 is an end elevational view of said chuck; and

Fig. 4 is a sectional view taken on lines 4—4 of Fig. 3.

Referring to Fig. 1, the same illustrates a winding machine including a head stock 1 and tail stock 2, the former being provided with a mandrel 3 having a chuck 4 fixed to the right hand end thereof and the latter being provided with the usual screw 5 having a dead center 6 on the left hand end thereof. Mandrel 3 can be driven by any suitable means such as a hand wheel 7 and the same is connected to a feed screw 8 through the medium of gears 9 and 10, said feed screw being adapted to feed the resistance wire from left to right as the same passes from a reel 11.

As before stated the winding machine is particularly adapted for winding resistance units of the character disclosed in my Patent No. 1,445,919, dated February 20, 1923. A resistance unit of this character is shown in Fig. 1 and briefly described the same includes a cylindrical insulating base 12 provided with a central opening 13. Resistance wire is coiled around said base and is divided into sections by a plurality of spaced terminal bands 14. Each of said bands is provided with a clamping screw 15 and has a plurality of circumferentially spaced lugs 16 to which the resistance wire can be connected to maintain the resistance value of the various sections within given limits.

Chuck 4 is designed to provide for connection of the individual resistance sections during winding thereof to resistance determining means hereinafter described. As shown in Figs. 2, 3 and 4 said chuck includes a hollow cylindrical member 17, formed of conductive material and having a brush 18 associated therewith, said brush being shown in Fig. 1. An insulated nut 19, for receiving mandrel 3 of the winding machine is fixed within the left hand end of member 17 and the right hand end of said member is externally threaded to fit within a cap member 20. Cap member 20 has a centering pin 21, fixed thereto, said pin being provided with a collar 22 of yielding material for abutting the end of the resistance unit and having a projecting end portion 23 adapted to fit within the opening 13 in the unit. Body member 17 is provided with inwardly projecting lugs 24 and 25 on opposite sides thereof and a grooved sheave 26 is arranged between said lugs and is rotatably mounted upon a pin 27 supported at

opposite ends by said lugs. Sheave 26 has a flexible lead 28 coiled thereon, one end of said lead being fixed to said sheave by a screw 29 and the other end thereof being passed through an opening 30 in cap 20. The outer end of flexible lead 28 has a terminal clip 31 fixed thereto, said clip having an opening 32 therein for receiving the binding screws 15 of the terminal bands on the resistance unit. Sheave 26 is biased by a spring 33 in a direction whereby clip 31 tends to move towards cap member 20.

The resistance determining means shown in Fig. 1 comprises a Wheatstone bridge W supplied with current from any suitable source such as a battery B. Said Wheatstone bridge includes the usual galvanometer G, resistances R and S connected in the right hand branch circuits and a calibrated and adjustable resistance T connected in the upper left hand branch circuit. Brush 18 of chuck 4 is connected at point 36 while feed screw 8 is connected at point 37.

The operation of the winding machine will now be more fully set forth. Prior to winding of a resistance section clip 31 is connected to the binding screw 15 on the terminal band 14 to the left of such section. With the circuit connections above described it is apparent that during winding of the section the resistance wire to the right of the band connected to terminal clip 31 will be included in the lower left hand branch of the Wheatstone bridge by a circuit extending from point 36 through brush 18 and chuck 4 to the terminal clip 31 of said chuck through the resistance to the right of the band to which said clip is connected through feed screw 8 to point 37. Assuming that resistances R and S are of the same ohmic value it is apparent that when the value of the resistance wound on the unit to the right of the terminal clip 31 equals the amount of resistance T included in circuit in the upper left hand branch of the Wheatstone bridge the galvanometer G will register zero. Thus in order to obtain a given value of resistance in the several sections it is only necessary to adjust resistance T for a given value and then wind until the galvanometer registers zero. The resistance wire is then connected to an adjacent lug 16 on the terminal band 14 to the right of the section last wound, allowance being made for the resistance included between the feed screw and the connection so made.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a winding machine for resistance units comprising a continuous wire forming a plurality of series connected resistance sections, of a resistance determining device, and means comprising an adjustable conductor terminal whereby different portions of the resistance wound by said machine may be successively and separately included in circuit with said device during the winding operation.

2. The combination with a winding machine for resistance units comprising a continuous wire forming a plurality of series connected resistance sections, of a device for determining resistance values, and means comprising a movable conductor terminal for successively connecting said device to different individual sections of the resistance on the unit during winding thereof.

3. The combination with a winding machine for sectional resistance units comprising a continuous wire forming a plurality of series connected resistance sections, of a device for determining resistance values, and a spring-biased adjustable conductor terminal for successively connecting said device to individual sections of the unit during winding of the latter.

4. The combination with a winding machine for sectional resistance units, of a device for determining resistance values and means for connecting said device to the resistance on the unit during winding thereof, said means including a chuck having an adjustable lead associated therewith adapted to be connected to different sections of the unit.

5. The combination with a winding machine for sectional resistance units, of a device for determining resistance values, and means for connecting said device to the resistance on the units during winding thereof, said means including a chuck provided with an insulated current carrying member, and an adjustable lead electrically connected to said current carrying member and adapted to be connected to different sections of the unit during winding thereof.

6. In a chuck for winding machines, the combination with an insulated current carrying member having work supporting means associated therewith, and an adjustable lead electrically connected to said member and adapted to be connected to the work supported by said chuck.

7. In a chuck for winding machines, the combination with an insulated current carrying member adapted to be fixed to a mandrel, of work supporting means associated with said member, an adjustable lead electrically connected to said member and adapted to be connected to the work, and means for tensioning said lead upon connection thereof with the work.

8. In a chuck for winding machines, the combination with an insulated current carrying member adapted to be fixed to a mandrel, of work supporting means associated with said member, a sheave carried by said member, a flexible lead mounted on said sheave and adapted to be connected to the work, and means associated with said sheave

for maintaining said lead under tension upon connection thereof with the work.

9. In a chuck for winding machines, the combination with a hollow cylindrical member, a brush for engaging the outer surface thereof, of an insulated supporting part fixed within said member, work supporting means carried by said member, a sheave rotatably mounted within said member and biased against movement in one direction, and a flexible lead mounted on said sheave, said lead being adapted to be connected to the work and to be held under tension by said sheave.

In witness whereof, I have hereunto subscribed my name.

DAVID STONE.