

United States Patent

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[56]

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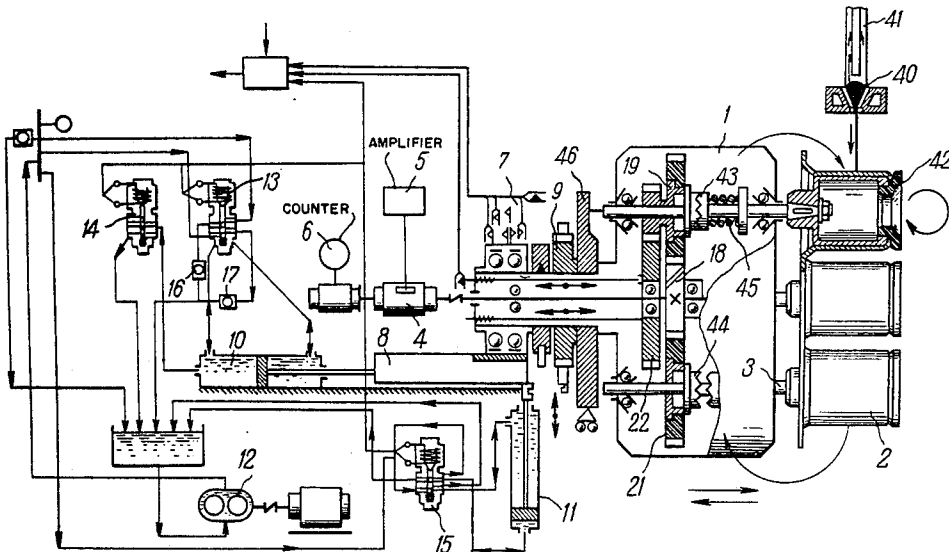
[54] DEVICE FOR WINDING MICROWIRE
2 Claims, 3 Drawing Figs.

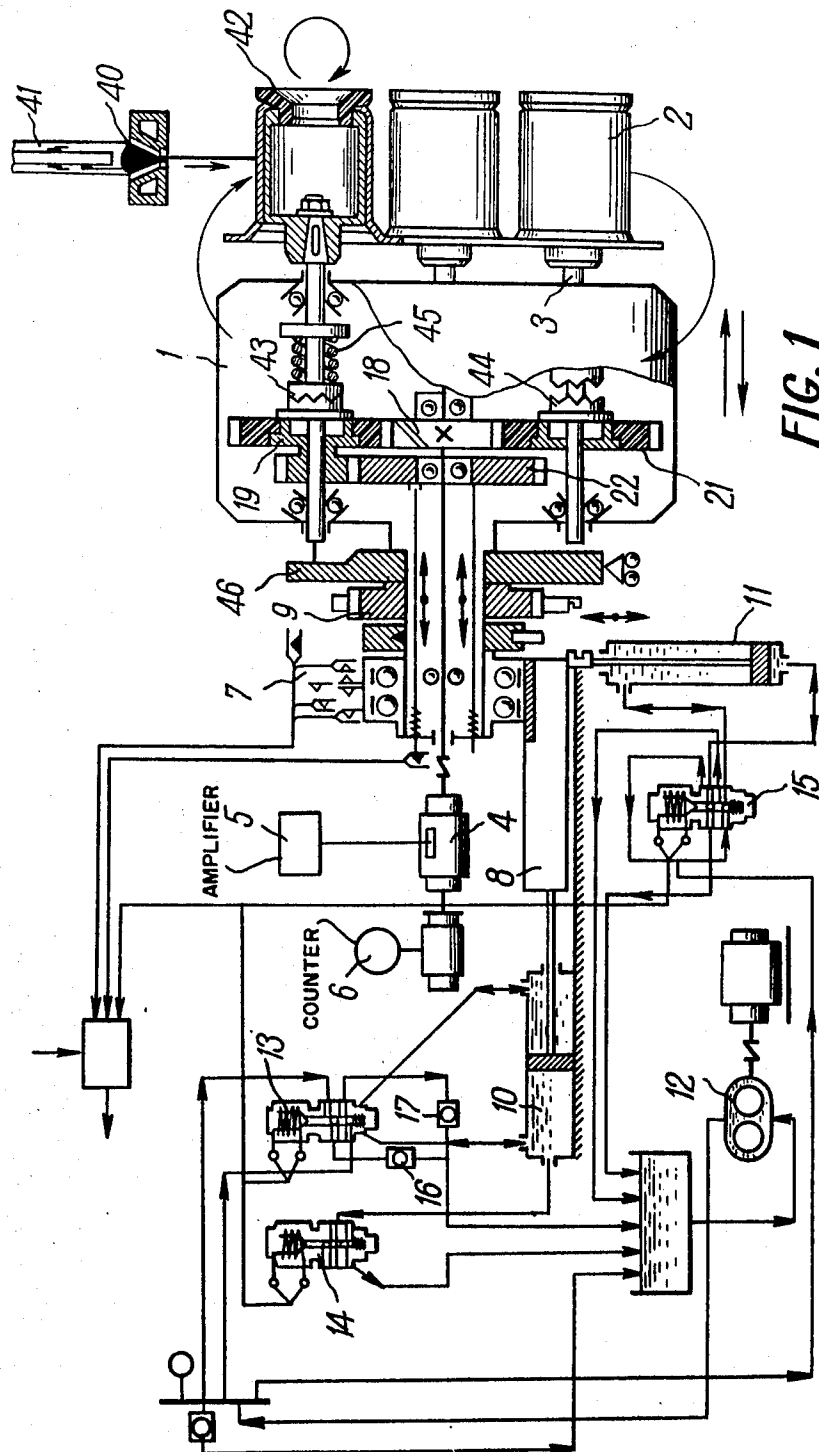
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18 A

ABSTRACT: A device is provided for winding microwire in the course of its manufacture and comprises a carriage mounted for reciprocating movement and carrying a winding mechanism inclusive of a multiposition turret head. Mounted on the turret head are spindles with bobbins and the spindles are driven in rotation through a coupling such that the spindle carrying the bobbin on which the wire is being wound and a subsequent spindle with a bobbin being prepared for winding are driven in rotation for each position of the head.





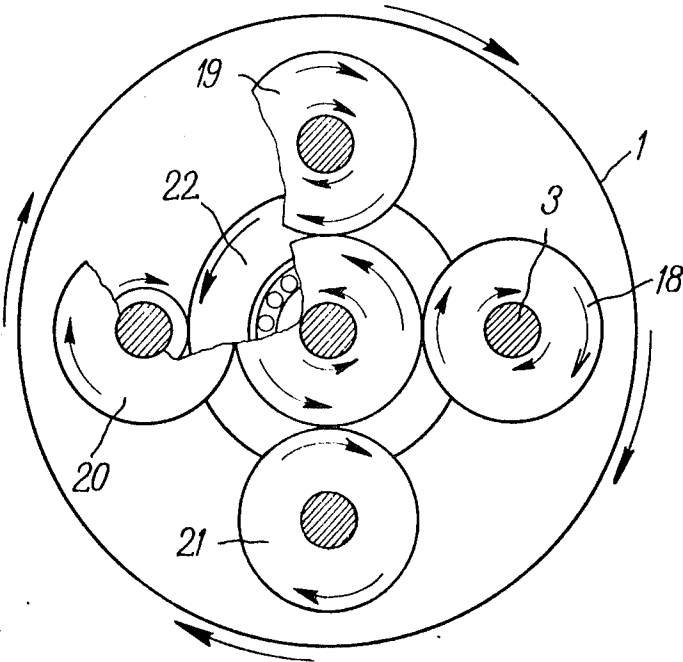
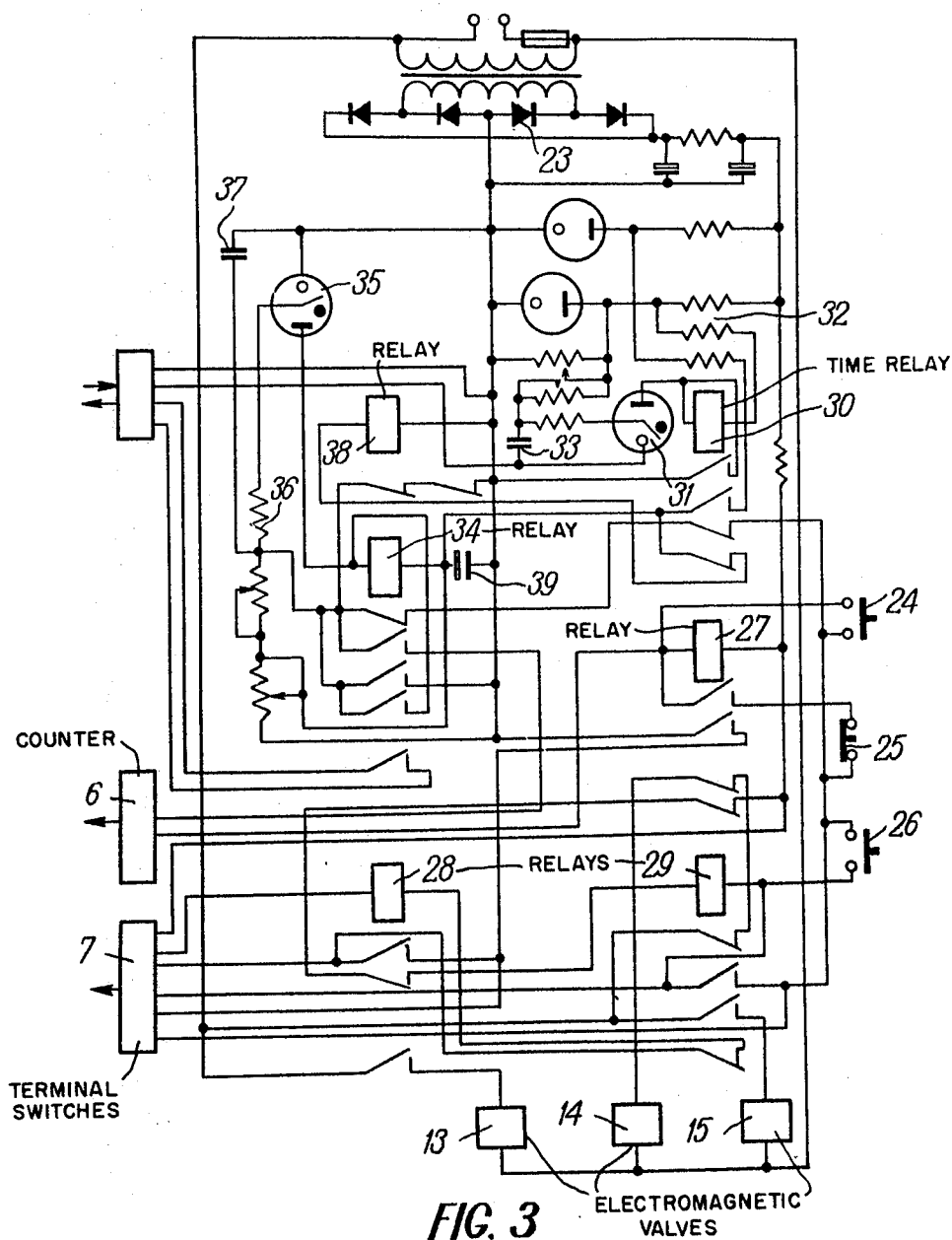


FIG. 2



DEVICE FOR WINDING MICROWIRE

The present invention relates to devices for continuously winding threadlike materials on bobbins and, more particularly, to devices for winding glass-insulated cast microwire in the course of manufacturing the same.

Conventional mechanisms used for winding such microwire, which have a winding spindle coupled with a rotation drive and a mechanism for distributing the microwire coils on the bobbins, are disadvantageous in that they require manual replacement of bobbins, readjusting in the case of microwire breakage, and they are generally adapted for winding the wire of a certain type only.

Such devices are of low efficiency and provide for poor quality winding.

It is an object of the present invention to eliminate the aforementioned disadvantages.

Another object of the present invention is to provide a device which is highly efficient and ensures quality winding of the microwire in the course of casting the same.

Still another object of the present invention is to provide a universal device capable of effecting winding of wires made from various materials, metals and alloys, at different rates of winding.

Yet another object of the present invention is to provide a device which can automatize the process of winding wires on bobbins.

To accomplish the aforementioned objects a winding device is sought which ensures automatic replacement of bobbins and control over the winding process.

To achieve the above, in the device according to the present invention a reciprocating carriage mounts a winding unit made as a multiposition turret head with a plurality of spindles connected to the rotation drive by means of couplings in such a manner that the spindle carrying the bobbin onto which wire is being wound and the subsequent spindle with the bobbin being prepared for winding are imparted rotation at every position of the head.

It is expedient to use as drives imparting reciprocation to the carriage and position turning of the head, hydraulic power cylinders controlled by electromagnetic and throttle valves having microswitches for the carriage extreme positions, a relay controlled by wire continuity and a time relay presetting the rate of winding respectively in their control circuits.

The following description of an exemplary embodiment of the present invention is given with reference to the accompanying drawings, in which:

FIG. 1 is a diagrammatic illustration of the device for winding microwire, according to the invention;

FIG. 2 is an elevation view, partly broken away, of the turret head used in the device according to FIG. 1; and

FIG. 3 shows the electric circuit of the device according to FIG. 1.

The device according to the present invention is universal and can be built into machines for casting microwires from various materials, such as copper, silver, resistance alloys, etc.

The device comprises a multiposition turret head 1 (FIG. 1) with bobbins 2 set on spindles 3 which are imparted rotation by an electric motor 4, a magnetic amplifier 5 is used for controlling the electric motor 4 and a counter 6 for counting the footage of the microwire being wound.

Additionally, provision is made for a system of terminal switches 7 actuated on during reciprocation of carriage 8 mounting the turret head 1, or during replacement of the bobbins 2 by ratchet gear 9 for turning of the head. To displace the carriage 8 and to turn the ratchet gear 9, use is made of power hydraulic cylinders 10 and 11 incorporated in an oil supply system having a pump 12.

This system also comprises electromagnetic valves 13, 14 and 15 distributing the oil flow in the system during reciprocation of the head 1, in the case of microwire breakage or when a command is given to shift the head 1 to its initial position, as

well as during the turn of the head 1. Throttle valves 16 and 17 control the rate of linear movement of the turret head 1 by switching over the drainage of the working fluid.

Gears 18, 19, 20 and 21 (FIG. 2) corresponding to the bobbins 2 and gear 22 of the electric motor 4 (FIG. 1), used in the turret head 1, are so selected that, with the employment of the magnet amplifier 5, in its one position the device provides for a rate of winding within the range of 5 to 60 m./min., and in the other position 60 to 800 m./min. and more, which allows the device to be used for winding microwires of both small and large cross sections.

The number of the spindles 3 used in the head 1 is determined by the technological requirements and may vary in practice from 3 to 8.

The control circuit of the proposed device is built with standard electrical components and comprises stabilized supply rectifier 23 (FIG. 3), starting buttons 24, 25 and 26 and relays 27, 28 and 29.

To effect automatic control, the control circuit incorporates a time relay 30 controlling the frequency of commands supplied, with thyatron 31, a set of resistors 32 and condenser 33; relay 34 controlled by continuity of the microwire with thyatron 35, a set of resistors 36 and condenser 37; and relay 38 of the circuit regeneration having a condenser 39.

Constructively, the aforesaid control circuit is essentially a separate unit having a remote connection with the terminal microswitches, valves and counter of the device.

The device operates as follows.

The high frequency field in the machine for casting microwires melts and keeps in the suspended position batch 40 (FIG. 1) of metal, introduced into glass tube 41.

The softened glass of the tube 41, which has the form of a glass capillary, is drawn off a gob and, with the spindle 3 of the bobbin 2 rotating, is introduced into a split between the bobbin and the spindle boss 42. The hydraulic cylinder 10, imparting reciprocation to the head 1 to distribute the wire coils on the bobbin 2, is started in operation by the starting button 24 through the intermediary of the control circuit.

Prior to this, the valve 14, overlapping the outlet of the working fluid, is switched on followed by the valve 13, as a result of which the receiving head moves forward. The reverse motion is effected when the valve 13 is deenergized by the terminal switches 7. The rate of forward and reverse motion of the turret head 1 is controlled within a wide range by overlapping the throttle valves 16 and 17 in the working fluid (oil) drainage system.

After the glass capillary of the microwire starting portion is fixed on the bobbin and the hydraulic cylinder started, no participation of the operator is required in the control over the operation of the device. The glass capillary is wound on the bobbin until all excessive glass is drawn off the gob and a signal indicating the presence of metal, i.e. the glass-insulated microwire core, appears. In case the control system does not produce signals indicating microwire breakage, a command is given for accelerated shifting of the turret head 1 to its initial position, said command being given by the valves 13 and 14 and opening a free passage for the oil from the rear portion of the hydraulic cylinder 10.

The moment the turret head 1 approaches its extreme initial position, the valve 15 is actuated by the terminal switches 7 and the control circuit, and the hydraulic cylinder 11 through the intermediary of the ratchet gear 9 smoothly turns the head 1 through $360^\circ/n$ (where n is the number of spindles), thus preparing for operation a subsequent bobbin 2. The bobbins are started in operation by cam semicouplings 43 and 44 and a rod disposed inside the spindle of the bobbins, with the aid of helical spring 45, engaged at one end against the sliding block of the cam semicoupling 44 and sliding at its other end along camplate 46.

With multiposition turret head 1 turned through $360^\circ/n$, one of the bobbins 2 in the upper portion of the head 1 rotates at the speed of the bobbin onto which the microwire is being wound and is also ready for receiving the wire after a new turn

of the head. The other bobbins do not rotate, and the bobbins onto which wire has been already wound are replaced with new ones.

With a new bobbin started into operation, the microwire is automatically fixed between this bobbin and the boss 42, breaking off from a filled-up bobbin. The turret head 1 keeps with the aid of the relay 34 controlling the continuity of the microwire in a predetermined second technological interval, whereupon, in case the process goes on normally, the control circuit commences operation of the hydraulic cylinder 10 to distribute the wire coils on the bobbin, and simultaneously starts supplying signals to the counter 6 counting the footage of the wire being wound. The wire is wound on every bobbin until the device presetting the number of the footage of wire to be wound operates or the process is discontinued. In these cases, the turret head 1 is quickly shifted by a command from the control circuit to its initial position and is turned through $360^\circ/n$ thus bringing into operation another bobbin, whereupon the winding cycle is repeated.

The terminal switches 7 are disposed in such a manner that during the first forward stroke of the head 1, the microwire is laid from one end of the bobbin to the other, whereas the reverse and all subsequent strokes (except for cases of breakage) are 5 to 10 mm. shorter than the first one, which

makes it possible to free the bobbin ends off for measurement.

What we claim:

1. A device for winding microwire in the course of manufacturing the same, comprising a carriage for reciprocating movement: winding means including a multiposition turret head mounted on said carriage; spindles with bobbins disposed on said turret head; a drive means for rotating said spindles of the turret head; coupling means connecting said spindles with the drive means such that the spindle carrying the bobbin onto which the wire is being wound and the subsequent spindle with the bobbin being prepared for winding are imparted rotation at every position of the head; a second drive means for imparting reciprocation to said head to distribute the wire coils on the bobbin; and a third drive means for position turning of said head.

2. A device according to claim 1, wherein the second and third drive means respectively comprises hydraulic power cylinders controlled by electromagnetic and throttle valves having a switch for the carriage extreme positions, a relay responsive to the continuity of the microwire and a time relay presetting the rate of winding, respectively in series in their control circuits.

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