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E. I. WALDMAN ET AL
WIRE PREHEATING DEVICE

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2 Sheets-Sheet 1

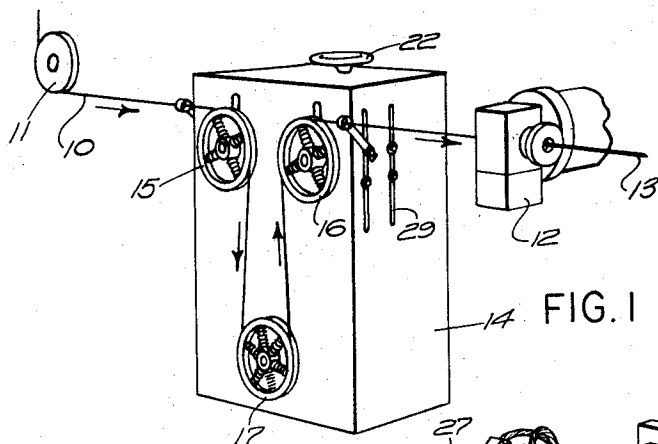


FIG. 1

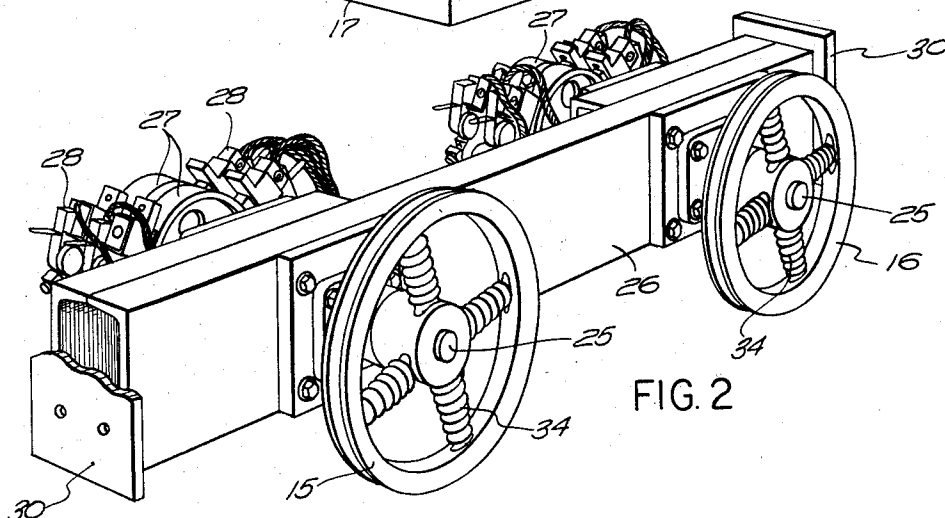


FIG. 2

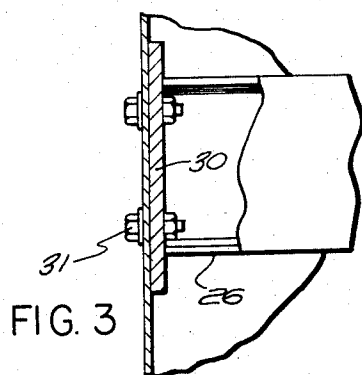


FIG. 3

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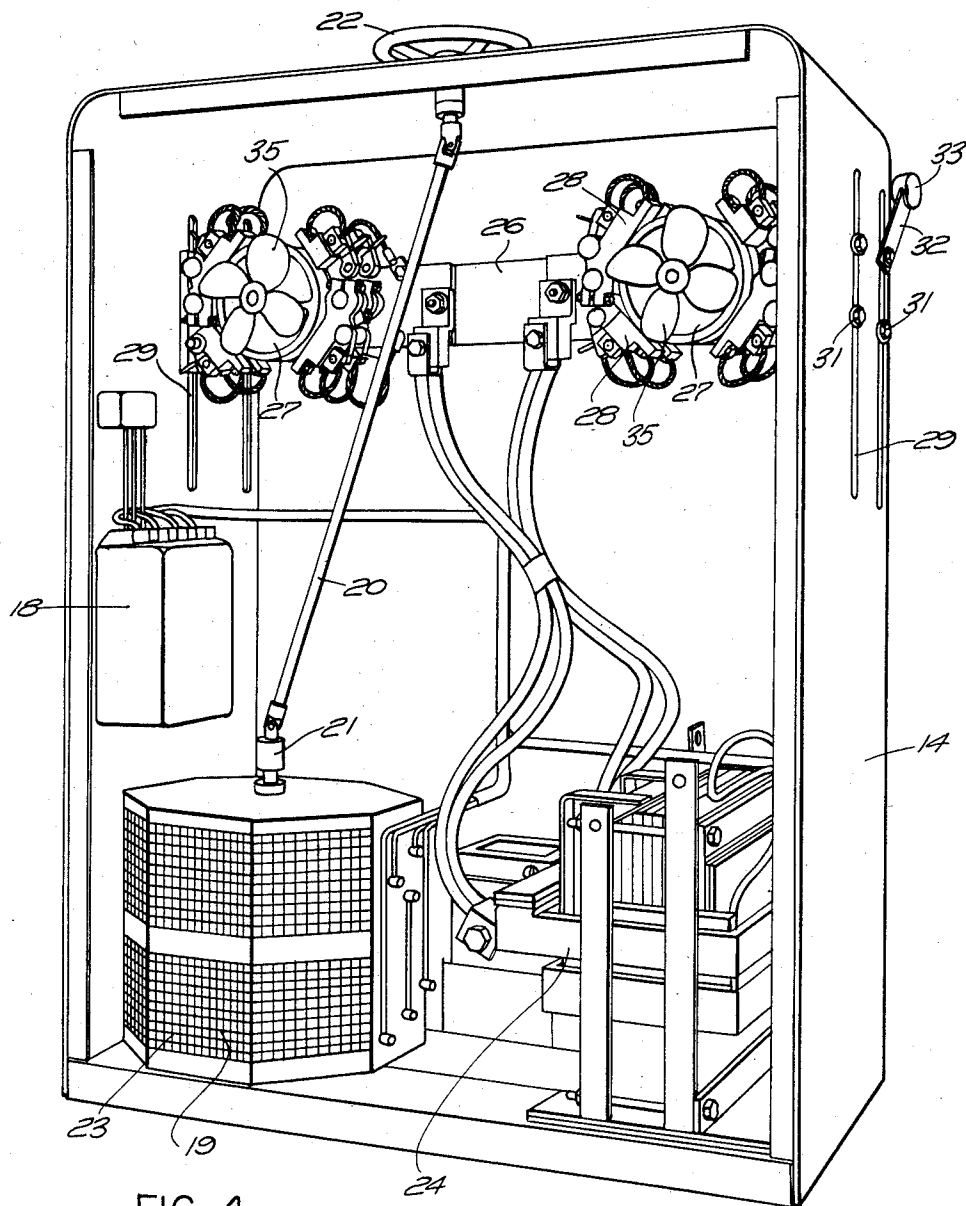


FIG. 4

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WIRE PREHEATING DEVICE

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3 Claims. (Cl. 219—155)

Our present invention relates to the electrical art and more particularly to a preheating device for electric wire and cable fed into an extruding die.

The principal object of the present invention is to provide a device for preheating a bare conductor wire before it enters the extruding die which normally coats the wire with a dielectric covering.

Another object of the present invention is to provide a preheating device which permits continuous controlled preheating of the wire in motion.

A further object of the present invention is to provide a preheating device having a positive heat control at any speed of movement of the wire.

Another object of the present invention is to provide a preheating device which is readily portable and can easily be installed with the other wire manufacturing equipment.

A further object of the present invention is to provide a preheating device which is completely adjustable for height, speed, and temperature requirements.

With the above and other objects and advantageous features in view, our invention consists of a novel arrangement of parts, more fully disclosed in the detailed description following, in conjunction with the accompanying drawings and more particularly defined in the appended claims.

In the drawings,

Fig. 1 is a perspective view of a device embodying our invention.

Fig. 2 is an enlarged perspective view of the adjustable contact supports.

Fig. 3 is an edge view showing the mounting of the vertical adjustment.

Fig. 4 is an enlarged perspective view showing the interior of the housing.

Electrical conductor wire and cable is normally coated with a dielectric sheath of plastic or rubber. The wire is fed from a letoff reel through an extruding die at speeds ranging from 200 feet to 2000 feet per minute. It has been found that a more uniform, smoother and thinner coat can be applied if the wire is preheated before entering the die. Preheating the wire removes the moisture and reduces the difference in temperature between the wire and the coating in the die to virtually zero. This permits efficient operations at high speed.

Prior to the present invention, various types of preheaters have been used, principally of the gas type. These preheaters are comparatively crude. The gas lines present a fire hazard, the flames must be under constant vigilance and the temperature was the result of a great deal of guesswork.

The present invention is designed to provide an electrically operated preheating device which is comparatively simple in construction and can be easily synchronized to conform with the particular wire forming and coating device being used. The preheater of the present invention uses electric current of high amperage to heat the wire. It provides for adjustment and control of the

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amperage. This permits accurate temperature control at all speeds and eliminates all the guesswork and hazards involved in the use of gas burning equipment.

Referring more in detail to the drawings illustrating our invention, Fig. 1 shows the general position and operation of the preheater of the present invention. The bare wire 10 is fed from a pulley 11 and a source of supply (not shown) to an extruding die 12 where it issues coated as at 13. For uniform results the wire must be fed into the die at exact right angles. Between the pulley wheel 11 and the die 12 is positioned the preheater of the present invention. The electrical elements and supports are housed in a rectangular housing 14. Extending from the upper front portion of the housing 14 are a pair of spaced aligned grooved wheels 15 and 16. Extending from the front of the housing 14, adjacent the bottom, is a third grooved wheel 17. Viewing Fig. 1, the wire 10 passes over the wheel 15, down to and around the wheel 17, up and over the wheel 16 into the die 12. To ensure perfect alignment, the wheels 15 and 16 are vertically adjustable.

The basis of the invention is the use of an electric current with sufficient amperage to heat the wire before it passes into the die 12. This is accomplished by attaching one electrode to the wheel 15 and the other electrode to the wheel 16. The wheel 17 is an idler. Thus the length of the wire from the wheel 15 passing around the wheel 17 and up to the wheel 16 is subject to the electric current. The present invention provides a means for regulating this current so as to obtain the desired temperature regardless of the size or speed of the wire. This is accomplished by transforming an A.C. current of standard voltage and amperage to an A.C. current of low voltage and high amperage. By varying the final voltage and amperage the temperature of the wire can be controlled.

Referring to Fig. 4, the electrical mechanism for accomplishing the above results is mounted in the housing 14. The device may be designed to start with an initial line current of 110, 220, 440, or 550 single phase 60 cycle A.C. current. This is lead into the switch and fuse box 18. From there the current is lead into a variable auto transformer 19. This comprises a single winding transformer having a rheostat action. The transformer 19 is controlled from a shaft 21 operated by a rod 20 which extends to the top of the housing 14 to a control wheel 22. A suitable dial may be provided on the top of the housing so that the settings of the wheel 22 may be indicated and followed. It will be noted that the transformer 19 is housed in a perforated housing 23 having sufficient air spaces to help dissipate the heat created by the resistance of the transformer. From the auto transformer 19 the current passes into a transformer 24 which may be supplied with taps so that the desired ratio can be selected.

The function of the auto transformer 19 and the regular transformer 24 may be explained as follows. Assuming that the current entering the device is a 220 v. line current. The fixed transformer 24 will convert this current into a 15 v. current. The auto transformer 19 interposes a resistance between the line current and the transformer 24. This resistance is variable so that the voltage can be controlled between 0 and 220. This will result in a voltage from the transformer 24 between 0 and 15. By changing the setting to different taps on the transformer 24, the final voltage ratio can be dropped to between 0 and 7½. The wire is moving at speeds of from 200 feet to as high as 2000 feet per minute. The wire is heated in a range of from 200° F. to 400° F., depending on the type of coating required. Since the amperage will depend on the input voltage, the heat can be regulated by the auto transformer 19 which regulates the line voltage

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into the transformer 24. Thus the wire can be fed into the die 12 at the correct temperature to produce the best results. The heat of the wire will drive out any moisture. The temperature of the wire should be approximately equal to the temperature of the coating at the die 12. Since there is a heat loss between the device and the die, the wire is normally heated to a higher temperature initially. For example, certain plastic materials are applied at a temperature of 285°. It has been found that if the wire is heated at the device to approximately 350° it will reach the die 12 at the desired temperature.

The current is fed to the wheels 15 and 16 by the arrangement shown in Figs. 2 and 4. Each wheel is mounted on a shaft 25 which is journaled in bearings supported in a cross plate or bar 26. Mounted on the inside of the shafts 25 are a pair of current collector wheels 27. Mounted on opposite sides of the collector wheels 27 are standard brush holders 28, two on each side of each wheel. There are therefore eight brushes at each pair of collector wheels 27. This will afford sufficient contact for handling the current.

The vertical adjustment is provided by moving the cross bar 26 vertically. The housing 14 is provided with spaced vertical parallel slots 29 at each side. The cross bar 26 is provided with a plate 30 welded at each end. The plate 30 has four openings aligning with the slots 29. A bolt 31 extends through the slots 29 into each opening so that there are two bolts in each slot. The bolts can be loosened and the cross bar 26 moved upwardly or downwardly to the desired height and then the bolts retightened. If desired a handle or other manually engageable portion may be attached to the cross bar 26 to extend through the slots. As a guide for the wire 10, a bar 32 having a ring 33 may be mounted beneath one of the bolts 31 at each side as shown in Fig. 1. This will assist in lining up the wire.

A considerable amount of heat is generated at the unit and provision is made for dissipating the same. As has previously been pointed out the auto transformer 19 is provided with a housing 23 designed to permit the circulation of air and dissipate the heat. In addition, heat is generated at the brushes and collector wheels and heat is generated at the wheels 15, 16 and 17 by the passage of the hot wire. Note that the wire makes a quarter turn in contact with the wheels 15 and 16 and a half turn in contact with the wheel 17. These wheels get hot and add to the heat of the device. We therefore provide the wheels 15, 16 and 17 with fins 34 at the spokes of the wheels to help dissipate the heat. At the inner end of each shaft 25 a fan 35 is mounted as shown in Fig. 4. This also causes circulation of air over the brushes and collector wheels. The wheels 15, 16 and 17 are independently insulated from each other and from the housing to prevent short circuiting and to permit the operator to touch the device without experiencing a shock.

The device of the present invention thus provides a compact preheating unit which can easily be installed at the correct height between the source of supply of the wire and the die. The preheating is uniform and continuous. The temperature can be positively controlled at any speed. Since there is no flame there is no oxidation or fire hazard. With a minimum number of moving parts the device requires little maintenance for efficient operation. Other advantages of the present invention will be readily apparent to a person skilled in the art.

We claim:

1. A preheater for an electrical conductor wire being fed into an extruding die, comprising a rectangular hous-

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ing, a pair of spaced, horizontally aligned, grooved wheels rotatably mounted on the front wall of said housing adjacent the upper end thereof, said upper wheel mounting comprising a horizontal adjustable support mounted in said housing, a shaft rotatably mounted in said support for each wheel and extending through the front wall of said housing, the other end of each shaft having a pair of collector wheels mounted for rotation with each shaft, and a plurality of brushes mounted on said support in contact with said collector wheels, means for cooling said wheels, a grooved wheel rotatably mounted on the front wall of said housing adjacent the bottom end thereof, said conductor wire passing over one upper wheel, down and around the lower wheel and up and over the other upper wheel, and means for applying an electric current to the portion of the wire extending between said upper wheels and around said lower wheel to heat the wire.

2. A preheater for an electrical conductor wire being fed into an extruding die, comprising a rectangular housing, a pair of spaced, horizontally aligned, grooved wheels rotatably mounted on the front wall of said housing adjacent the upper end thereof, said upper wheel mounting comprising a horizontal adjustable support mounted in said housing, a shaft rotatably mounted in said support for each wheel and extending through the front wall of said housing, the other end of each shaft having a pair of collector wheels mounted for rotation with each shaft, and a plurality of brushes mounted on said support in contact with said collector wheels, a fan mounted on the inner end of each of said shafts for cooling said collector wheels, said upper wheels having cooling fins, a grooved wheel rotatably mounted on the front wall of said housing adjacent the bottom end thereof, said conductor wire passing over one upper wheel, down and around the lower wheel and up and over the other upper wheel, and means for applying an electric current to the portion of the wire extending between said upper wheels and around said lower wheel to heat the wire, said current applying means including a variable auto transformer and transformer for adjustably reducing the voltage and raising the amperage of the line current.

3. A preheater for an electrical conductor wire being fed into an extruding die, comprising a rectangular housing, a pair of spaced, horizontally aligned, grooved wheels rotatably mounted on the front wall of said housing adjacent the upper end thereof, said upper wheel mounting comprising a horizontal adjustable support mounted in said housing, a shaft rotatably mounted in said support for each wheel and extending through the front wall of said housing, the other end of each shaft having a pair of collector wheels mounted for rotation with each shaft, and a plurality of brushes mounted on said support in contact with said collector wheels, a fan mounted on the inner end of each of said shafts for cooling said collector wheels, said upper wheels having cooling fins, a grooved wheel rotatably mounted on the front wall of said housing adjacent the bottom end thereof, said conductor wire passing over one upper wheel, down and around the lower wheel and up and over the other upper wheel, and means for applying an adjustable predetermined electric current of low voltage and high amperage to the portion of the wire extending between said upper wheels and around said lower wheel to heat the wire.

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