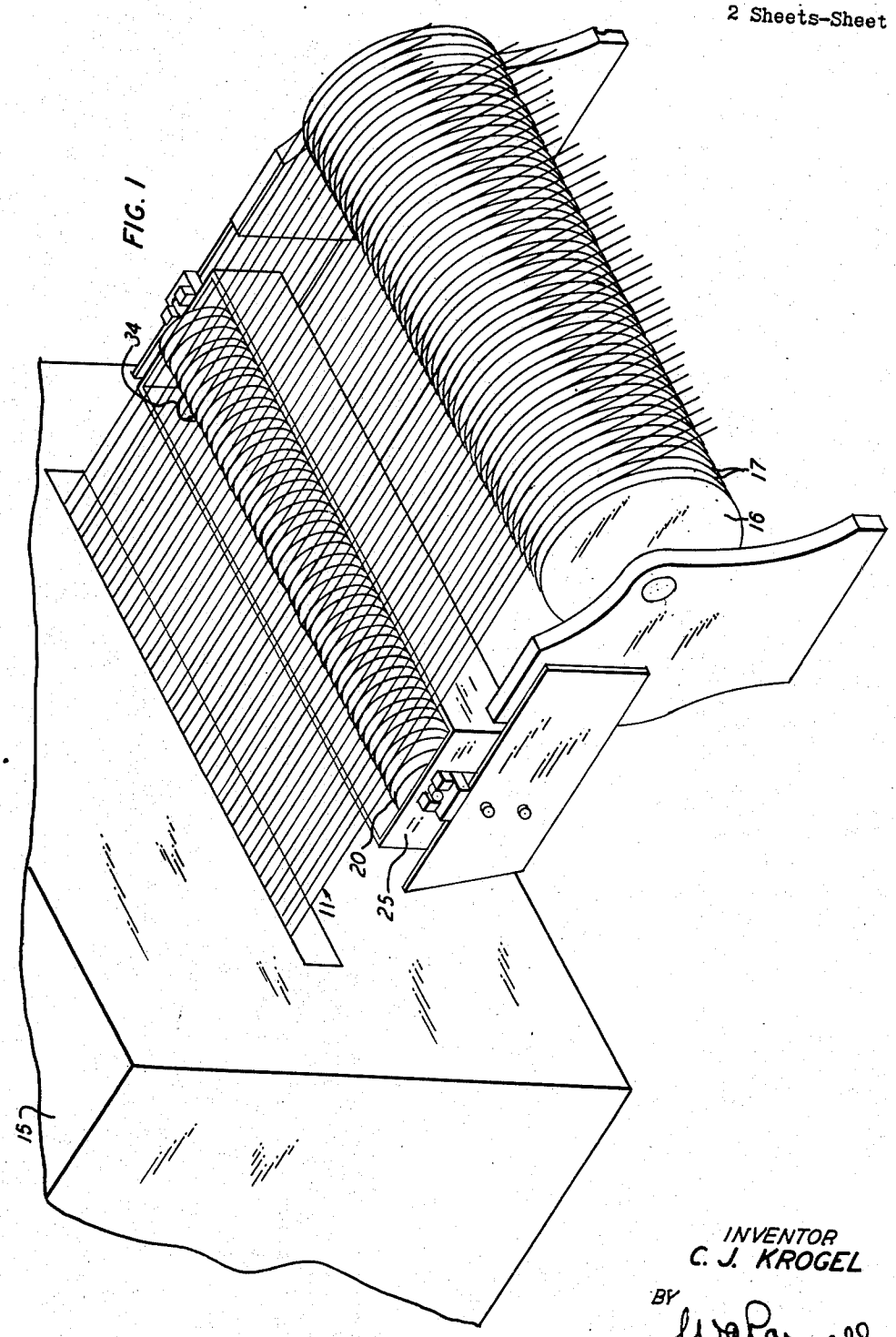
Aug. 31, 1954 C. J. KROGEL 2,687,677

METHOD OF CONTROLLING THE DENSITY OF PULP INSULATION

Filed March 29, 1952

2 Sheets-Sheet 1

FIG. 1



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FIG. 2

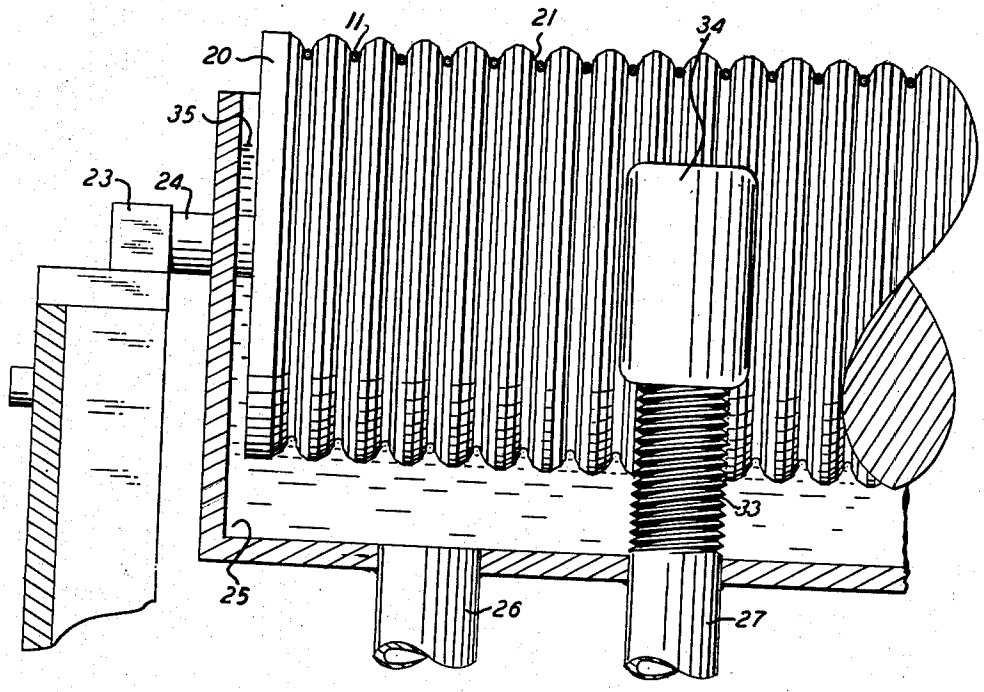


FIG. 3

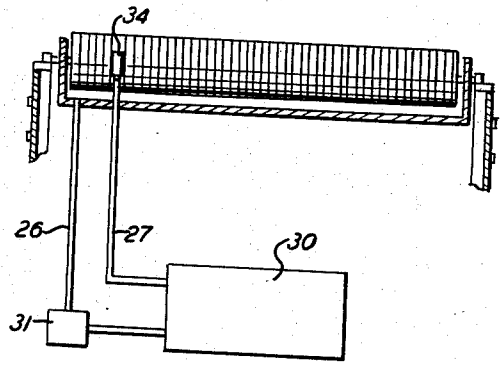
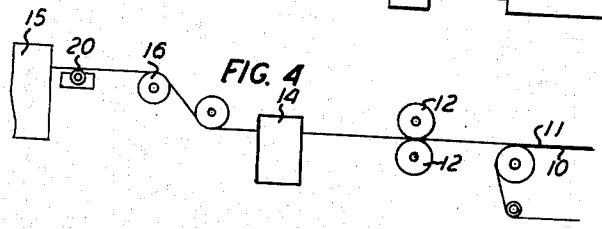


FIG. 4



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METHOD OF CONTROLLING THE DENSITY OF PULP INSULATION

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4 Claims. (Cl. 92—39)

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This invention relates to methods of controlling the characteristics of insulating material and more particularly to methods of controlling the density of pulp insulation on electrical conductors.

In the manufacture of telephone cable, the mutual capacity between conductors should be as low as possible to minimize the amount of artificial loading required. For this reason, cable specifications usually require that the capacity should not exceed certain values. Since the specific inductive capacity of pulp is higher than that of air, the mutual capacity may be reduced if the density of the pulp insulation is kept low by occluding as much air as possible within the pulp. It is well known that the air content of dried insulation is increased by removing less water from the pulp in the sheath forming operation so that a higher percentage may be removed in the drying ovens, leaving the sheath with a higher percentage of voids. This is not possible however, with the facilities presently used for forming the sheath of pulp insulating material on the wire. The sheath when initially formed on the wire is a ribbon of pulp which must pass between suitable squeeze rollers for the removal of a high percentage of the water therefrom before it passes through the polisher and is formed into a sheath on the wire. If the squeeze rollers should be adjusted to allow a higher percentage of water to remain in the pulp, the pulp would clog the polishers, creating an undesirable result.

The object of the present invention is a method of efficiently and variably controlling the density of pulp insulation.

With this and other objects in view, the invention comprises a method for adding water to the formed insulation and subsequently drying the insulation to reduce the density of the insulation on the completed wire. The apparatus selected for the practice of the method is embodied in a pulp insulating machine wherein a multiplicity of wires are singly provided with ribbons of pulp containing a high percentage of water after which a great percentage of the water is removed by squeeze rolls prior to the wire and ribbon passing through a spinning polisher to form the ribbon in a sheath about the wire. The invention deals with a wire at this point wherein a controlled amount of water is supplied to the wet insulation on the wire to saturate it to a given degree causing fluffing up of the fibers of the pulp insulation to provide air pockets during subsequent drying of the insulation thus decreasing the density of the pulp, increasing its size so that

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initially less pulp need be used for each wire and improving the characteristics of the insulating material.

Other objects will be apparent from the following detailed description when considered in conjunction with the accompanying drawings wherein:

Fig. 1 is an isometric view of a portion of a pulp insulating machine embodying the invention;

Fig 2 is a fragmentary vertical sectional view of a portion of the apparatus by the aid of which the method may be practiced;

Fig. 3 is a fragmentary vertical sectional view of a portion of the apparatus illustrating the fluid controlling means, and

Fig. 4 is a schematic illustration of a portion of a pulp insulating machine embodying the invention.

Referring now to the drawings, attention is first directed to Fig. 4 which schematically illustrates a Fourdrinier wire 10, travelling in a continuous path to form a ribbon of water saturated pulp insulation 11 on a wire. In the present embodiment of the invention a multiplicity of wires disposed at spaced positions are fed simultaneously to the machine where ribbons of pulp insulating material are formed simultaneously on the wires. The ribbon is formed in the usual way but from less pulp than usual travelling on the Fourdrinier wire during which time a certain percentage of the water is removed by section. On leaving the Fourdrinier wire 10, the conductive wires with their pulp ribbons are fed between squeeze rollers 12 where sufficient water is removed from the pulp to allow the individual spinning polishers 14 to wrap the sides of the ribbons about the wires to form a tight sheath of pulp thereon.

The insulated wires are directed over a roller 16 where their individual spacings are maintained by the grooves 17 in the roller. A roller 20, of the contour shown in Fig. 2 with deep grooves 21 therein partially conforming to the circular cross-section of the insulated wires, is supported for rotation at 23 on a shaft 24 and disposed in a receptacle 25. The receptacle 25 has a supply pipe 26 and an overflow pipe 27 extending into the bottom thereof. A supply tank 30 is positioned beneath the receptacle where the overflow pipe 27 enters the upper portion of the tank. A fluid pump 31 is disposed in the supply line 26 leading to the tank 30. The overflow pipe 27 extends upwardly into the receptacle 25 with a threaded upper portion 33 to receive a member 34. The member 34 is open at its upper end and with

its threaded engagement with the pipe **27**, it will be adjusted vertically to vary the position of its upper open end and thus the level of the liquid in the receptacle with respect to the roller **20**.

The liquid referred to and identified by reference numeral **35** in Fig. 2, is water or water containing a given percentage of dye to color the pulp insulation on the wire. The percentage of dye in the water is so small and will not affect the result to be attained by the method of an apparatus for controlling the density of the pulp insulation on the wire.

Considering now the carrying out of the method steps through the aid of the apparatus, it will be apparent that a wire with a pulp insulation thereon is subjected to a variable amount of water to fluff up or space the fibers in the pulp to increase the overall size of the sheath of pulp insulation and to thereby lower the density of the pulp. The degree of saturation of the pulp depends on the amount of water carried in the groove to the insulated wire. The formation of the groove in the roller causes the water therein to completely surround the insulation on the wire. The next step of the method according to the apparatus is to dry the pulp. Due to the fact that, through the aid of this method, the cross-sectional contour of the pulp insulation is increased in size, a smaller amount of pulp may be used initially to form the ribbon on the wire. Therefore, less pulp may be used to produce a more efficient insulating sheath of the same size. By varying the amount of water picked up by each groove **21** in the roller **20** through the adjustment of the outlet **34**, the percentage of the pulp insulation on the wire that is fluffed up by the water is variably controlled. The cross-sectional dimensions of the inner portions of the grooves are substantially equal to the maximum cross-sectional contour of the pulp insulated wire at the completion of the fluffing step. Therefore, it is possible for the water in each groove to surround the pulp insulated wire.

What is claimed is:

1. The method of controlling the characteristics of pulp insulation on wire comprising forming a ribbon of water saturated pulp on the wire, squeezing the major portion of the water from the ribbon, forming the ribbon into a circular covering of wet pulp insulation on the wire, fluffing up the fibers of the pulp insulation on the wire by completely saturating the wet pulp insulation with water, and removing the water from the pulp insulation.

2. The method of controlling the characteristics of pulp insulation on wire comprising forming a ribbon of water saturated pulp on the wire, squeezing the major portion of the water from the ribbon, forming the ribbon into a circular covering of wet pulp insulation on the wire, decreasing the density of the pulp insulation on the wire by submerging the wet pulp insulation in water for a given length of time, and removing the water from the pulp insulation.

3. The method of controlling the characteristics of pulp insulation on wire comprising forming a ribbon of water saturated pulp on the wire, squeezing the major portion of the water from the ribbon, forming the ribbon into a circular covering of wet pulp insulation on the wire, decreasing the density of the pulp insulation on the wire to predetermined variable values by subjecting the wet pulp to variable amounts of water, and removing the water from the pulp insulation.

4. The method of controlling the characteristics of pulp insulation on wire comprising forming a ribbon of water saturated pulp on the wire, squeezing the major portion of the water from the ribbon, forming the ribbon into a circular covering of wet pulp insulation on the wire, simultaneously fluffing up the fibers of the wet pulp insulation by completely saturating the wet pulp insulation with water to decrease the density thereof and dyeing the pulp insulation by saturating it with a water soluble dye, and removing the water from the pulp insulation.

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