Dec. 6, 1932. O. A. FREDERICKSON 1,890,253

WEATHERPROOF WIRE AND METHOD AND MEANS OF MAKING SAME

Filed Jan. 10, 1929 2 Sheets-Sheet 1

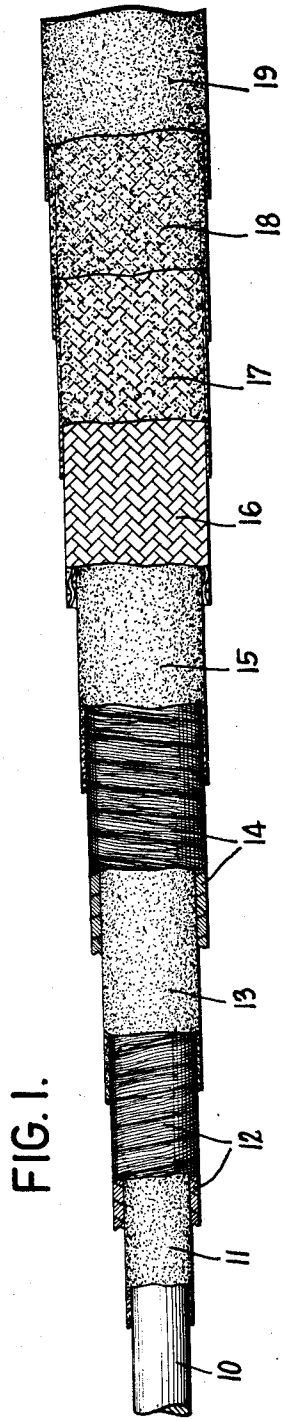


FIG. 1.

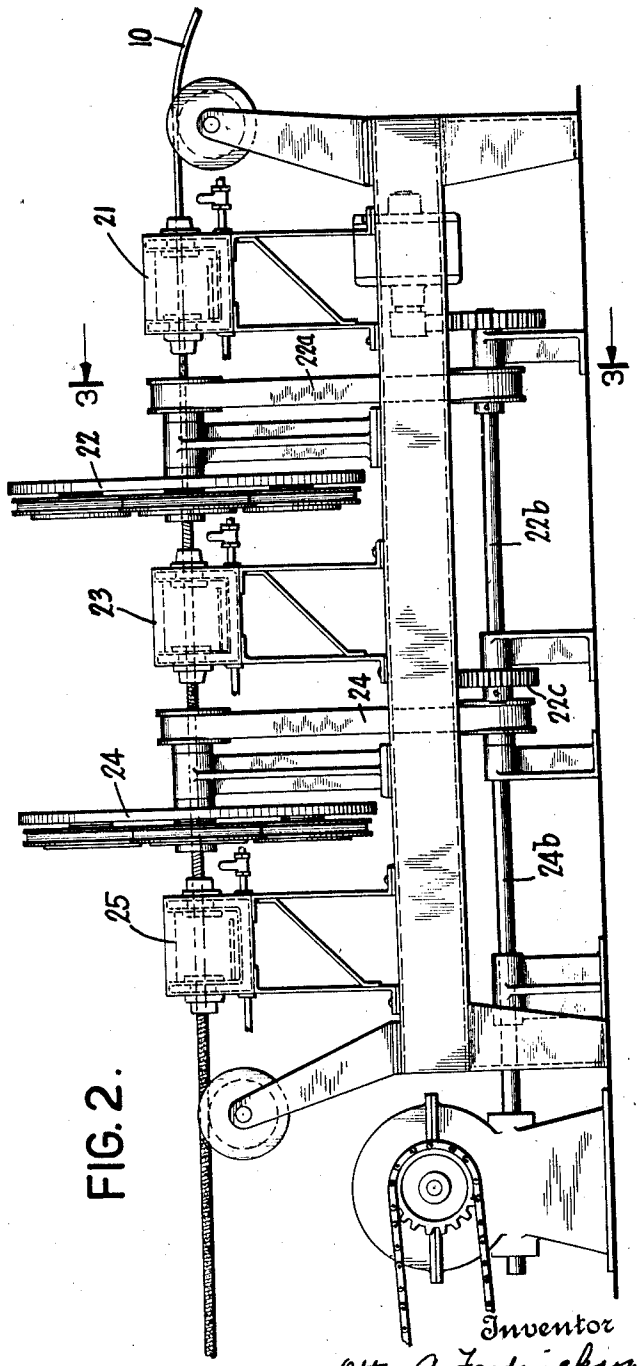


FIG. 2.

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WEATHERPROOF WIRE AND METHOD AND MEANS OF MAKING SAME

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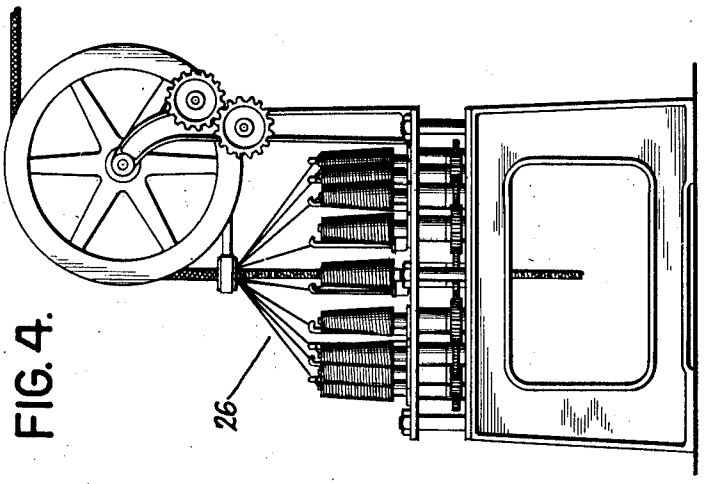


FIG. 4.

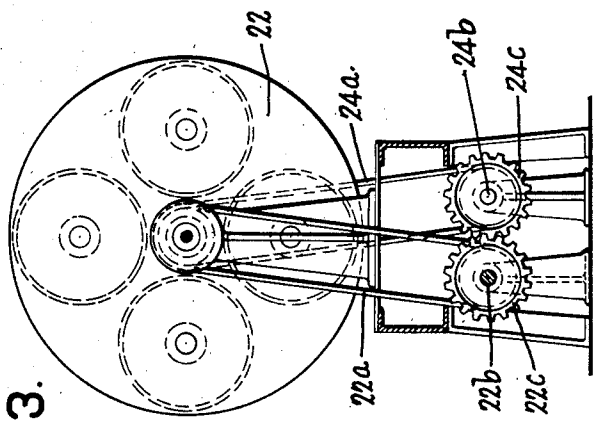


FIG. 3.

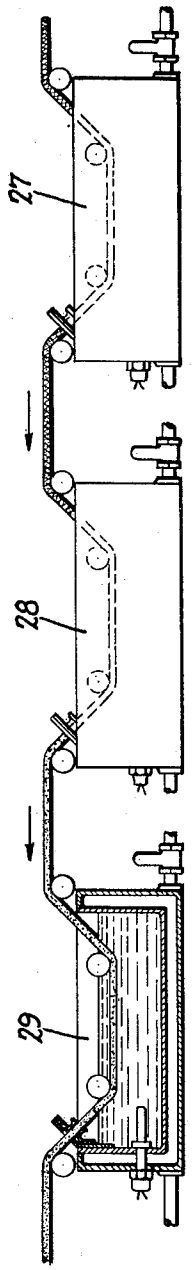


FIG. 5.

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UNITED STATES PATENT OFFICE

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WEATHERPROOF WIRE AND METHOD AND MEANS OF MAKING SAME

Application filed January 10, 1929. Serial No. 331,694.

This invention relates to improvements in weather proof wire and improvements in methods and means for making the same.

Heretofore so-called weather proof wire has been made by taking a central conductor and first covering it with a number of wrapped loosely woven braids. In some wires three such layers of braiding have been employed, one disposed over the other. After the multiple braids have been placed on the wire, such covered wires have been passed through saturating wax and on account of the multiplicity of braidings which were employed, it has been necessary to utilize saturating wax having a relatively low melting point in order to saturate through the braids. Furthermore, the braids have been themselves comparatively loosely woven in order to permit the ingress and proper saturation during the saturating step. After the braids have been thus saturated, the wire is coated with a coat of finishing wax and it is then ready for use.

When in use the heat in the summer time melts the saturating wax and such saturating wax runs down and tends to collect or even drip off from the bottom of the wire. This leaves voids in the upper part of the braiding which may even extend to the copper conductor itself. Subsequently in the winter time the rain fills these voids and when freezing occurs the water is turned into ice. This freezing action itself may burst some of the strands of the braids but in any event the constant change of weather conditions over a period of time, the varying conditions of heat and cold, dry and wet conditions and expansion and contraction, will break the strands of the braids and inasmuch as there is relatively little compound left in such braiding, the strands will break and expose the copper. Even if the copper is not fully exposed, the insulating properties of the covering will be very much minimized.

The present invention has for its object the provision of new wire and the method of making the same whereby the above objectionable characteristics of present day weather proof wire may be obviated.

A further object of the present invention is to provide a weather proof wire of such character that the impregnating material may be retained in the wire irrespective of changing temperature conditions.

A further object of the present invention resides in the provision of a wire which may have inner layers impregnated with a compound of relatively low melting point, which layers are covered over and protected by another covering comprised of a compound having a high melting point. The arrangement is such that the outer coverings protect the inner coverings and prevent the action of the sun from melting out and damaging the saturation of the inner coverings.

A further object of the present invention resides in the provision of a novel form of wire with an improved kind of covering preferably, comprising a plurality of wrapping and with the impregnating material impregnated into the various wrappings in an improved manner.

A further object of the present invention resides in the provision of a wire in which the various coverings or wrappings are both interiorly and exteriorly impregnated. Accordingly, tight wrappings may be employed in contradistinction to loose wrapping as heretofore and such tight wrappings will individually receive a thorough impregnation with the ultimate result that the insulating and strength and weatherproof characteristics of the wire will be improved and made more lasting.

Other objects of the present invention reside in an improved method and machine for making the improved wire.

Further and other objects will be hereinafter set forth in the accompanying specification and claims and shown in the drawings which by way of illustration show preferred embodiments of the invention.

In the drawings:

Figure 1 is a detail part sectional view of the improved wire;

Fig. 2 shows a machine for placing on the wire certain fibrous paper-like coverings;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2, and showing the manner of driv-

ing the wrapping devices to wrap the fibrous paper coverings in reverse directions;

Fig. 4 is a view of a braiding machine for carrying out one of the braiding steps in the process;

Fig. 5 is a detail view of the saturating machine which is employed in certain of the steps in the process.

In more detail the ultimate wire will be first described.

Referring now to Fig. 1, 10 represents the conductor proper, over this conductor there is disposed an initial layer of an asphaltic compound indicated at 11. Over such layer of compound there is disposed a first continuous overlapping relatively solid flexible sheath 12 comprising fibrous crinkled paper strands compacted together and disposed in overlapping relation to adjacent convolutions. 13 represents a further layer of asphaltic compound disposed over layer 11 and saturated thereinto. 14 is the second continuous overlapping relatively solid and flexible sheath and this sheath is similar to that of 12, except that the strands are preferably wrapped in reverse direction with respect thereto. Over the layer 14 is another layer of asphaltic compound 15. Disposed over this layer 15 is a tightly woven braid covering 16. Disposed over such layer 16 and impregnated therein is another layer of asphaltic compound 17. Covering this layer of asphaltic compound there is a layer of stearin pitch compound 18 which compound preferably has a relatively high melting point, for example, one having a melting point of around 200 degrees F. Over this layer 18 there is a non-sticker dressing 19 which may be of the composition set forth in U. S. Patent No. 1,635,829, dated July 12, 1927. Such dressing may be colored as desired.

The asphaltic compound used at 11, 13, 15 and 17 preferably has comparatively lower melting point than that of the layer 18. Preferably such asphaltic saturating compound should have a melting point of 150 degrees F. When the wire is finally completed the compound 11 will saturate into layer 12 from the inside, the compound 13 will saturate into the layer 12 from the outside and will also saturate from the inside of the layer 14. The compound 15 will saturate the layer 14 from the outside and will also saturate 16 from the inside which will in turn be saturated from the outside by 17. Thus each layer of wrapping will be both internally and externally saturated. By utilizing saturating compounds of asphaltic character inside and outside each wrapping it is possible to employ much tighter wrappings than heretofore because the saturation and impregnation of the individual wrappings may be effected by available saturating material which is disposed both inside and outside the wrapping and the outer saturation of one wrapping will afford heat to provide for the saturation and impregnation of such wrapping from the inside from the material which is previously disposed upon the wire or underlying wrapping. Such results could not be obtained heretofore where all wrappings were impregnated from the outside, which necessitated a rather loose wrapping construction to permit the complete penetration of the saturating compounds to the innermost interstices and layers. Further, saturation of the inner layers or some of them will furthermore be effected by the heat of the stearin pitch layer 18, it being remembered that this pitch has a relatively higher melting point than that of the asphaltic compound which is used on the internal layers. During the making of the wire the heat of this pitch itself acts to partially liquefy the asphaltic material which is within the wire and between various layers and in this way this inner asphaltic compound becomes thoroughly impregnated in the wrappings. When the wire is in use the stearin pitch is of such character that it does not of itself run down and melt under the influence of the sun. Furthermore, the arrangement of inner layers is such that protection is afforded to prevent the running out of the asphaltic impregnating material which is impregnated in the inner layers or wrappings. Accordingly, the ultimate insulated wire is one which is not only initially weather proof but which retains substantially for all times its weather proof characteristics.

The method and machine for making the wire will now be described.

Referring to Fig. 2 the conductor 10 is drawn off from a suitable reel not shown, and first passed through a saturating station as indicated at 21. This saturating station may be of any desired type, and preferably includes suitable means for keeping heated and fluid the asphaltic saturating compound which is contained therein. This saturator 21 is intended to place on the wire the layer designated 11 in Fig. 1. After the wire passes the saturator 21, it passes a wrapping machine 22. Such wrapping machine may be one substantially of the form described in the co-pending application of James M. G. Fullman and Louis J. Rittelmann, Serial No. 282,649, filed June 4, 1928 (now Patent No. 1,747,769, issued February 18, 1930). This wrapping machine has suitable provisions for tightly wrapping convolutions of crinkled and compact fibrous material such as crinkled paper upon the wire and for disposing the adjacent convolutions in overlapping relation at the edges as shown in Fig. 1 at 12. The wire covered with this wrapping emerges from the wrapping station 22 and passes through another asphaltic saturator 23. Such saturator is similar to that shown at

21 and is adapted to apply over the paper wrapping 12 the layer of saturating material 13. During the passage of the wire through the saturator 23 there is effected a re-melting of the lower layer 11. In this way and in this station of the machine there is afforded both an inner and outer impregnation of the layer 12 by the compounds 11 and 13.

The wire emerging from the saturator 23 passes through another wrapping station as indicated at 24, in which the layer of crinkled paper 14 is applied. This layer is preferably laid reversely with respect to layer 12 in the following manner. By referring to Fig. 3 it will be noted that the arrangement for driving the wrapping devices 22 and 24 is such that the device 24 is driven in reverse direction to that of 22. Wrapper 22 receives its drive by belt 22*a* driven from a pulley on shaft 22*b*. Wrapping machine 24 receives its drive from a belt 24*a* driven from a pulley on shaft 24*b*. Shaft 24*b* is driven in reverse direction with respect to shaft 22*b* by reason of the inter-meshing gearing 22*c* and 24*c*. The wire emerging from the wrapping station 24 passes through another asphaltic saturator 25. Here layer 15 is applied and the saturating operation which is effected in this step again re-melts to a certain extent the layer 13 and causes such layer to interiorly impregnate the layer 14. 15 likewise exteriorly impregnates the layer 14.

The wire thus in part fabricated is then drawn off from the machine in any suitable manner and reeled up upon a reel. Subsequently, the wire is passed through a conventional braiding machine 26, see Fig. 4, and in this braiding machine the tightly braided layer 16 is applied to the wire. After this braid 16 is applied the wire is again passed through a series of saturating and finishing devices.

Referring to Fig. 5 the wire passes through an asphaltic saturator 27 which applies the asphaltic layer 17. During the saturating period at this step there is a certain amount of re-melting of the previously applied layers of compound and particularly, layer 15 which is closest to the braid 16. This re-melting thus effects an interior saturation of the braid 16 and an exterior saturation is also effected by the saturator 27. On emerging from 27 the wire passes into a tank of stearin pitch 28. This material is maintained above the melting point of about 200 degrees F. and at about 450° F. This operation applies the layer 18 and during the passage of the wire through this tank there is a certain amount of re-melting of some of the asphaltic material previously applied to the wire and upon emerging from 28 these interiorly disposed asphaltic compounds re-congeal so as to provide for a final consolidation of the layers of wrapping which were previously subjected to a step by step saturation. Finally the wire is passed through another tank 29 where the non-sticker finish 19 is applied thereto. Such finish may contain any suitable coloring material. The wire is now reeled up and is ready for the market.

As before stated each successive saturating step serves to a certain extent to re-melt previously applied asphaltic saturating material and in this way there is a thorough impregnation of all of the tight wrappings which are applied to the wire.

Each of the various saturators may be provided with thermostatic controls so as to maintain the asphaltic compounds, the stearin pitch and the non-sticker composition at the proper heat. Preferably the asphaltic materials will be maintained in the neighborhood of 150 degrees F. and the stearin pitch in the neighborhood of 450 degrees F.

During the making of the wire, if desired, in order to facilitate the laying on of succeeding covering layers, the asphalt will preferably be allowed to set somewhat in order that the subsequent laying operations may be more readily effected.

When the fabrication of the wire is complete, the interior wrappings will be well permeated and impregnated with the asphaltic compound and such compound will be retained by the superimposed tightly wrapped or braided coverings and also by the outer stearin pitch covering, which on account of its composition and disposition is particularly adapted to resist the action of heat of the sun and to prevent the melting and running out from the wire, of the interior impregnating compounds which have a relatively lower melting point.

Certain features of the present invention are broadly claimed in my copending application Serial No. 426,492, filed February 7, 1930.

What I claim is:

1. A weather proof wire comprising a central conductor, a layer of asphaltic material thereon, a wrapping or sheath of fibrous material comprising compacted crinkled paper, a layer of asphaltic material over such sheath, another sheath of like paper material with asphaltic compound thereover, a braided covering also covered with asphaltic material and an outer coating of stearin pitch.

2. The method of making weather proof wire which comprises covering a conductor with successive layers of covering material comprising compacted crinkled paper, and in effecting impregnation of the layers individually as the covering proceeds, and in thereafter covering the whole with a material which has a higher melting point than that of the previously applied impregnating material to thereby effect a re-melting and re-

impregnation of the previously applied impregnating material.

3. A weather proof wire comprising in combination with a central conductor, and an insulating and weather proof covering therefor, comprising a fibrous wrapping of compacted crinkled paper about the wire interiorly and exteriorly saturated with asphaltic impregnating material, another fibrous wrapping of compacted crinkled paper without the first wrapping and interiorly and exteriorly saturated with asphaltic impregnating material, a braiding about said wrappings likewise interiorly and exteriorly impregnated with asphaltic material, and a further outer pitch like covering comprised of composition which has a relatively higher melting point than the asphaltic material so that it upon application re-melts and effects a re-impregnation of the previously applied asphaltic impregnating material which has a relatively lower melting point than the stearin pitch.

4. A weather proof insulated wire comprising a central conductor with coverings comprising a number of relatively solid but flexible sheaths of compacted crinkled paper disposed over each other, each sheath having the adjacent convolutions in the same layer overlapping each other at the edges of abuting adjacent convolutions in the same layer, and asphaltic material disposed above and below each sheath to impregnate the same from the interior and exterior of each sheath.

5. The invention set forth in claim 4 in which one sheath is reversely laid with respect to the other sheath.

In testimony whereof I hereto affix my signature.

OTTO A. FREDERICKSON.