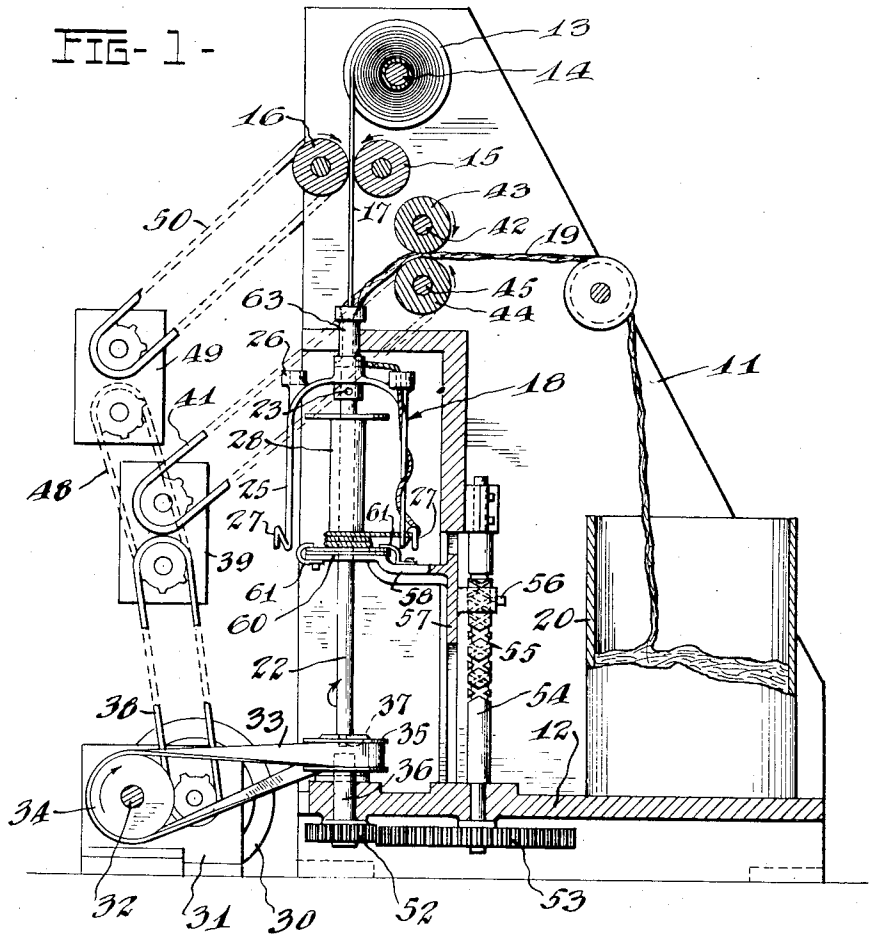
June 14, 1938. J. LE R. TUCKER 2,120,270

WIRE HAVING A COVERING OF FIBROUS MATERIAL

Original Filed Feb. 27, 1935 3 Sheets-Sheet 1

FIG- 1 -



Jesse LeRoy Tucker

INVENTOR.

BY J. F. Rule.

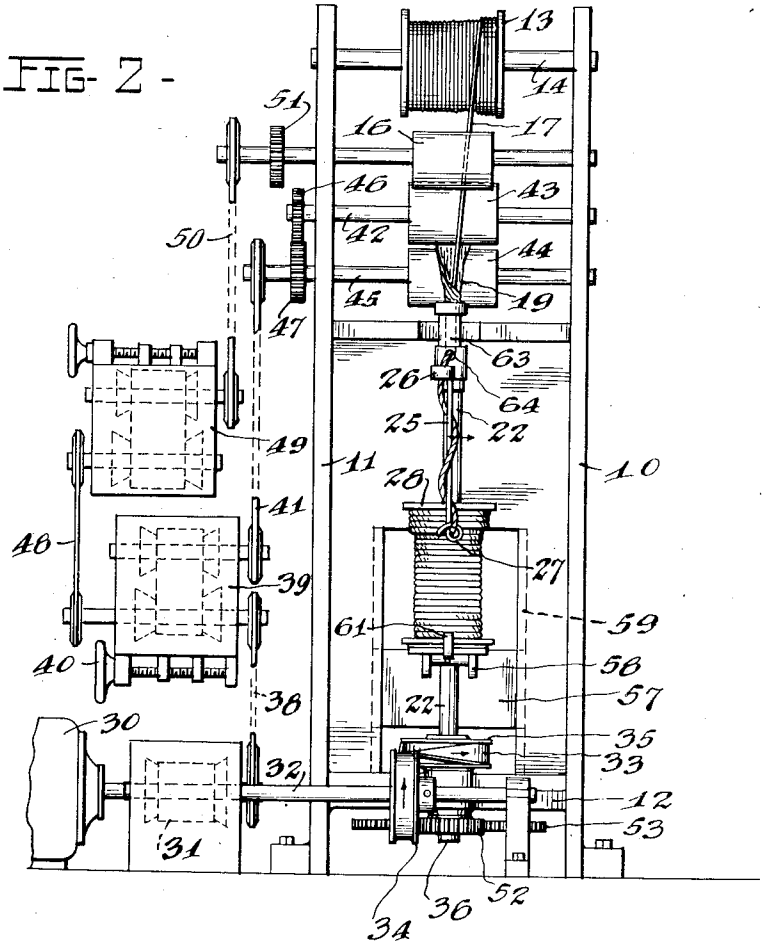
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Original Filed Feb. 27, 1935 3 Sheets-Sheet 2

FIG. 2.



Jesse LeRoy Tucker
INVENTOR.

BY J. F. Rule,
ATTORNEY

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Original Filed Feb. 27, 1935 3 Sheets-Sheet 3

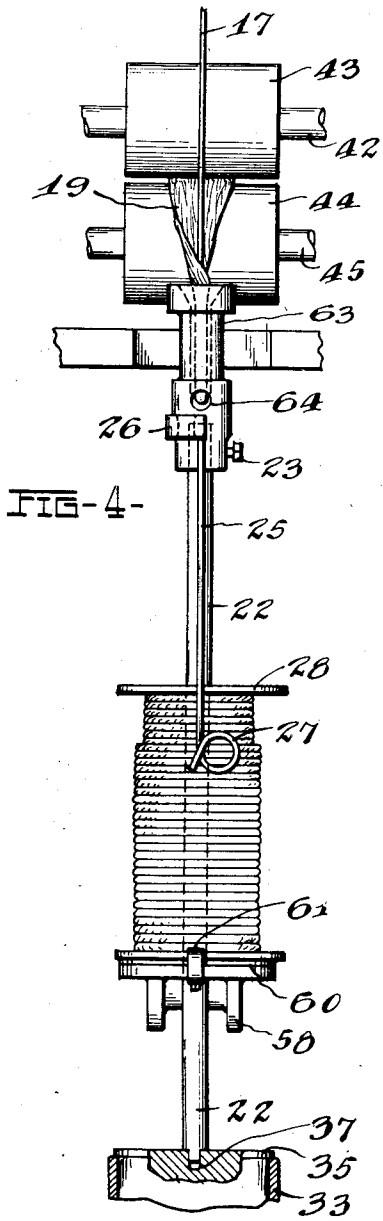
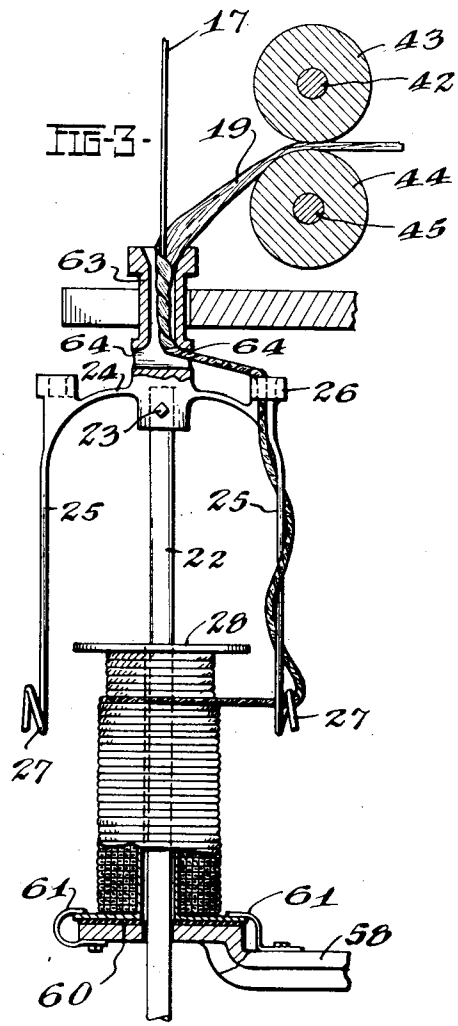


FIG-4-

FIG-3-



Jesse Le Roy Tucker

INVENTOR.

BY J. F. Rule.

ATTORNEY

Patented June 14, 1938 2,120,270

UNITED STATES PATENT OFFICE

2,120,270

WIRE HAVING A COVERING OF FIBROUS MATERIAL

Jesse Le Roy Tucker, Newark, Ohio, assignor to Owens-Illinois Glass Company, a corporation of Ohio

Application February 27, 1935, Serial No. 8,480
Renewed March 29, 1937

10 Claims. (Cl. 117—52)

My invention relates to wire having a covering of fibrous material. The invention in its preferred form comprises a fine wire wrapped spirally with a strand consisting of a multiplicity of fine fibres of glass, the strand being in ribbon like form.

An object of the invention is to produce a novel product or article which comprises a wire spirally wrapped with very fine fibres of an inorganic material, preferably fine glass fibres, with the fibres distributed over the surface of the wire in a layer of substantially uniform thickness throughout.

A further object of the invention is to provide a fine wire wrapped with an insulating coating or cover comprising glass fibres of such great fineness, and arranged in such a manner, that the insulated or covered wire may be sharply bent or may be tied in tight knots without breaking or injuring the individual fibres and without misplacing or disarranging the fibres.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a part sectional side elevation of an apparatus for wrapping a strand of fibrous material about a wire in accordance with the principles of my invention.

Fig. 2 is a front elevation of the apparatus.

Fig. 3 is a fragmentary, part sectional side elevation on a larger scale, showing particularly the flyer.

Fig. 4 is a front elevation of the same.

The apparatus is mounted on a framework comprising side frame members 10 and 11 and a base plate or platform 12. A spool 13 of the wire which is to be wrapped, is carried on a spindle 14. Beneath the spool is a pair of feed rolls 15 and 16 by which the wire 17 is fed downward to a flyer 18 by which a strand 19 of fibers is wrapped or wound spirally upon the wire. The strand 19 is supplied from a container 20 in which the strand has been coiled.

The yarn, roving, thread, or sliver, which forms a strand 19, preferably consists of a multiplicity of extremely fine fibres of glass arranged in ribbon-like form.

I have found in practice that the extremely fine fibres give very satisfactory results, the diameter of the individual fibres in some cases being as low as one-half micron. The diameters of the fibres comprising the roving or strand 19, may vary somewhat in the same strand. The average diameter may be about eight microns. Good results have also been obtained with somewhat coarser glass fibres in which the diameters may range as high as fifteen microns.

A sufficiently large number of the fibres are grouped together to produce a strand of great tensile strength, ample to permit the material to be wound on the wire with the apparatus shown and in the manner hereinafter described. The individual fibres may be of great length, sometimes many feet in length or practically continuous. The individual fibres forming the strand 19 may be arranged to extend generally in the direction of the strand, many of the fibres being approximately or substantially parallel. The fibres, however, are preferably intertwined or interwoven to a sufficient extent to reliably hold them in place when the strand is wound on the wire, preventing spreading or displacement of the strands or uncovering and exposure of the wire under any ordinary conditions to which it is subjected in use, as for example, when the wire is sharply flexed or bent, or subjected to abrasion or other external forces applied to the surface of the insulated wire.

The flyer 18 comprises a vertical spindle 22, to the upper end of which is secured, by means of a pin 23, the body 24 of the flyer. This body is in the form of a yoke having depending arms 25. Eyes 26 and 27 are provided at the upper and lower ends, respectively, of the arms 25, through which the covered wire is guided to a spool 28 on which the wire is wound.

The apparatus is driven by an electric motor 30 which operates through speed reduction gearing 31 to drive a shaft 32. Motion is transmitted from the shaft 32 to the spindle 22 through a belt 33 running on pulleys 34 and 35. The pulley 35 is mounted on a short shaft 36 journaled in the base plate 12, the pulley being provided with a socket 37 to receive the lower end of the spindle 22.

A sprocket chain or belt 38 transmits motion from the motor shaft to a speed changing and reduction device 39. The latter, which may be of conventional form, includes a hand wheel 40 for adjusting the speed ratio between the belt 38 and a belt 41. The latter transmits motion from the speed changing device 39 to a shaft 45 which carries the lower roll 44 of a pair of feed rolls, the upper roll 43 of the pair being mounted on a shaft 42. If desired, intermeshing gears 46 and 47 may be used on the shafts 42 and 45 to provide for a positive drive of both the feed rolls.

Motion is transmitted from the motor to the wire feeding rolls 15 and 16 through belt 38, a belt 48 extending to a speed change device 49, and a belt 50 extending from the latter to a pulley on the shaft of the roll 16. Intermeshing gears on the shafts of the feed rolls 15, 16, including a gear 51, provide for positively driving the roll 15. The speed changing device 49 permits the speed at which the wire is fed, to be adjustably varied and controlled. The speed changing mechanism 39, 40 in like manner permits the speed of the rolls 43 and 44, and there-

fore the speed at which the strand 19 is fed by the rolls, to be adjustably varied independently of the speed at which the wire is fed. By adjusting the relative speed of the wire 17 and the strand 19, the thickness of the layer of fibres wrapped on the wire may be controlled and adjustably varied as desired.

The spool 28 on which the covered wire is wound, is freely mounted for movement up and down on the spindle 22 and also for rotation relative to the spindle. Mechanism is provided for automatically reciprocating the spool vertically as the covered wire is wound thereon. Such mechanism includes a pinion 52 which drives a gear 53 on a shaft 54. The latter is formed with spiral grooves 55 in which runs a lug 56 carried on a bracket 57. The latter includes an arm or "rail" 58 which is formed to provide a seat for the spool. Rotation of the shaft 54 causes the bracket 57 to move up and down on guide rails 59, thereby moving the spool up and down as the material is wound thereon. The rotation of the spool 28 is much slower than that of the spindle 22 and in order to provide a sufficient drag or braking action of the spool, a layer of rubber 60 (Fig. 3) or like material may be interposed between the spool and its support. Springs 61 may also be provided to apply a downward pressure on the spool flange and thereby increase the drag.

The flyer 18 is provided at its upper end with a tubular guide 63 through which the wire and the strand of fibres are fed and guided during the wrapping operation. The lower end of the tube 63 is formed with eyes or openings 64 through which the covered wire is guided.

In operation, the wire 17 is continuously fed downward by the rolls 15 and 16 while the strand 19 is fed by the rolls 43 and 44 and the rotating flyer. As the strand 19 enters the tubular guide 63, it is wrapped spirally around the wire by the rotation of the flyer. The covered wire extends through the eyes 64 and 26, may be wrapped one or more times around the arm 25, and passes through the eye 27 and thence to the spool. The relative rate of speed at which the wire 17 and the strand 19 are advanced, determines the thickness of the fibrous coating. The speed of the flyer may be such that the strand 19 is drawn forward at a higher speed than that at which it would be advanced by the feed rolls alone. As the fibres comprising the strand 19 are untwisted and practically parallel, they provide an even covering for the wire of substantially uniform thickness throughout. As the wire is fed to the spool 28, the latter is caused to travel up and down in such manner that the wire is wound evenly thereon. When the spool has been filled, it can be removed by withdrawing the flyer and its spindle 22 upward through the spool.

Modifications may be resorted to within the spirit and scope of my invention. Although, by way of example, I have illustrated and particularly described a single wire wrapped with the insulating material, it will be understood that the invention covers a construction in which the insulating material is applied to a group or plurality of wires or a cable comprising a number of wires or conductors. The reference in the description and claims to a wire to which the insulating material is applied, are intended to cover such group of wires or cable.

I claim:

1. An article of manufacture comprising a wire and a covering therefor comprising an unwoven strand of glass fibres wrapped around and directly over the wire, the average diameter of the fibres being not more than about eight microns.

2. An article of manufacture comprising a wire and a covering therefor consisting of an unwoven, ribbon-like sliver of glass fibres wrapped around and directly over the wire, the average diameter of the fibres being not more than eight microns.

3. An article of manufacture comprising a wire, and a covering therefor comprising an unwoven strand of glass fibres wrapped spirally around and directly over the wire, said strand consisting of a multiplicity of fine fibres grouped in substantial parallelism and in ribbon like form, the average diameter of the fibres being not more than eight microns.

4. An article of manufacture comprising a wire, and a covering therefor comprising a strand of glass fibres wrapped spirally around and directly over the wire, said strand consisting of a multiplicity of fine fibres grouped in ribbon like form, said wire being of a size and material permitting it to be sharply bent or tied in knots, and said fibres being of such fineness and flexibility that they remain unbroken and uninjured when the wire with its said covering of fibres is flexed or knotted.

5. An article of manufacture comprising a fine metal wire, and an insulating covering therefor comprising a sliver of glass fibres wrapped spirally around and directly over the bare wire, said wire being of a size and material permitting it to be sharply bent or tied in knots, and said fibers being of such fineness and flexibility that they remain unbroken, uninjured and next to the wire when the wire with its covering of fibers is flexed or knotted.

6. An article of manufacture comprising a fine wire, and a covering therefor of glass fibers of microscopic fineness compactly arranged and all wrapped spirally in the same direction around the wire.

7. An article of manufacture comprising a fine wire, and a covering therefor of glass fibers of microscopic fineness wrapped spirally around the wire, said fibers having sufficient flexibility to permit the wire with the wrapping of fibers thereon, to be tied into close knots without destroying the integrity of said fibers.

8. An article of manufacture comprising a strand of flexible material, and a covering therefor of glass fibers of microscopic fineness compactly arranged with all the fibers wrapped spirally about said strand in the same direction.

9. The combination of a strand of flexible material, and a covering therefor comprising a sliver consisting of a multiplicity of glass fibers of great fineness, said sliver being wrapped spirally around and enveloping said strand with all the fibers which form the covering extending spirally in the same direction.

10. A product of manufacture comprising a single strand of flexible material, and a covering therefor consisting of a sliver wrapped spirally around said strand, said sliver consisting of a multiplicity of substantially parallel glass fibers having a fineness of the order of eight microns or less in diameter.

JESSE LE ROY TUCKER.