Nov. 12, 1946. K. A. FALCONER 2,410,815

METHOD AND APPARATUS FOR APPLYING ASBESTOS TO WIRE

Filed Oct. 10, 1942 4 Sheets-Sheet 1

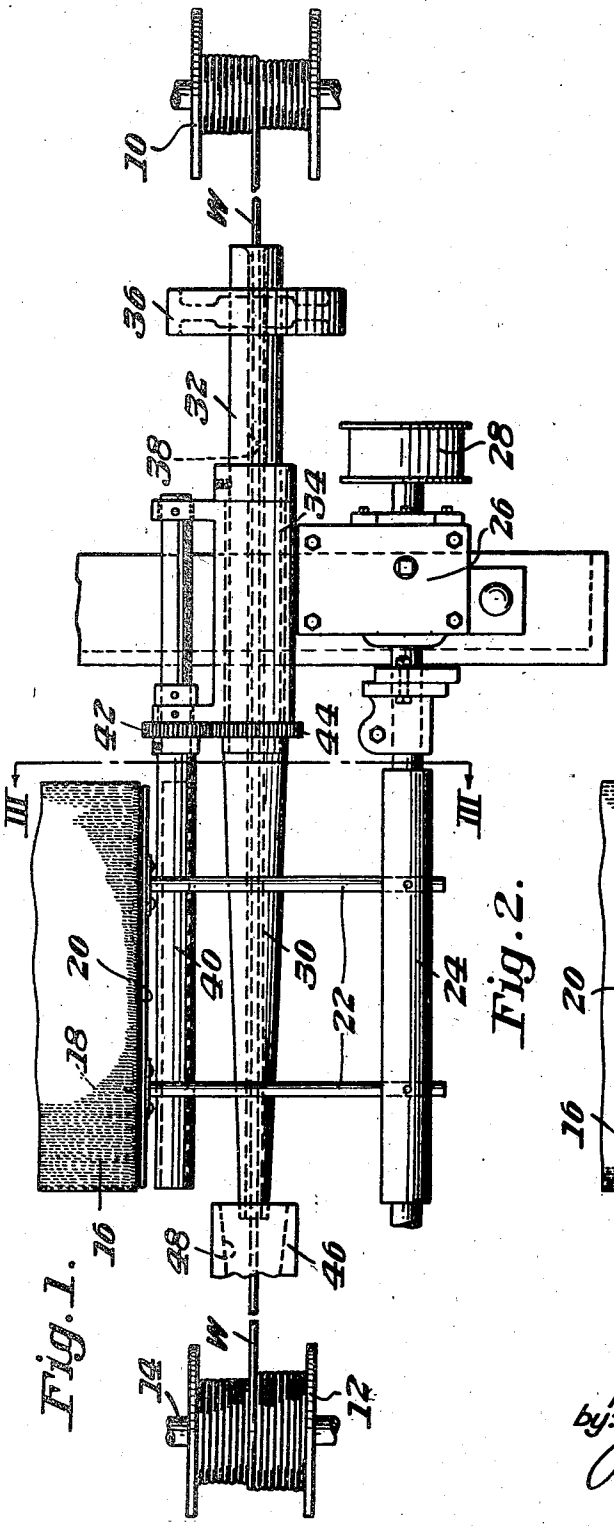


Fig. 1.

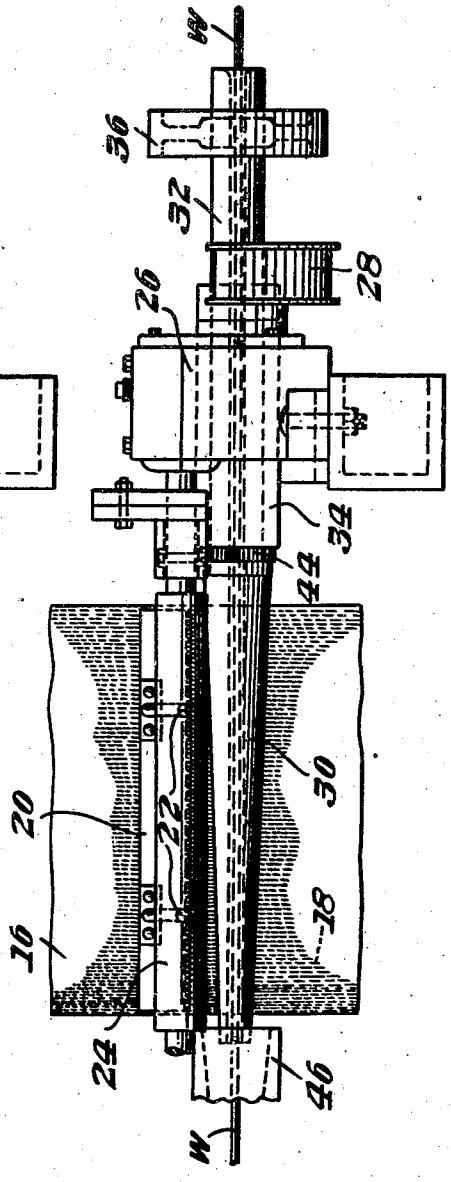


Fig. 2.

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Fig. 3.

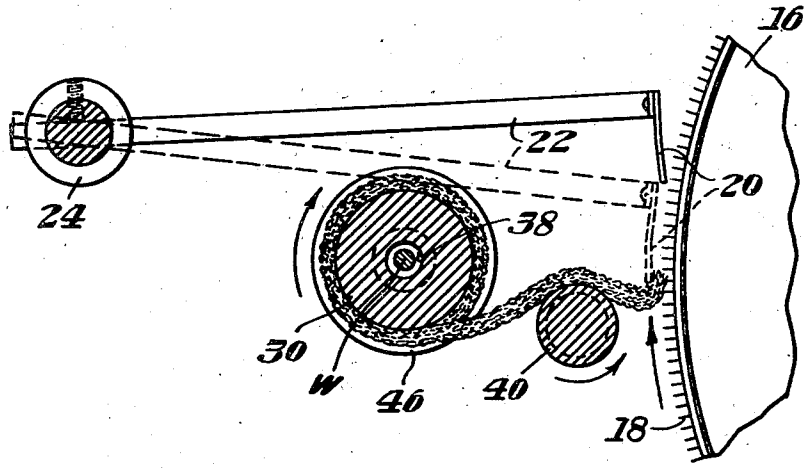
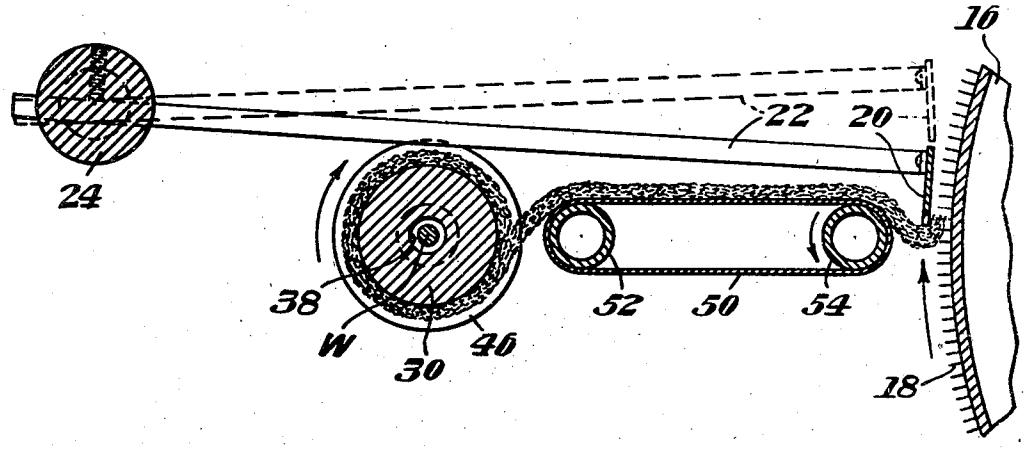


Fig. 6.



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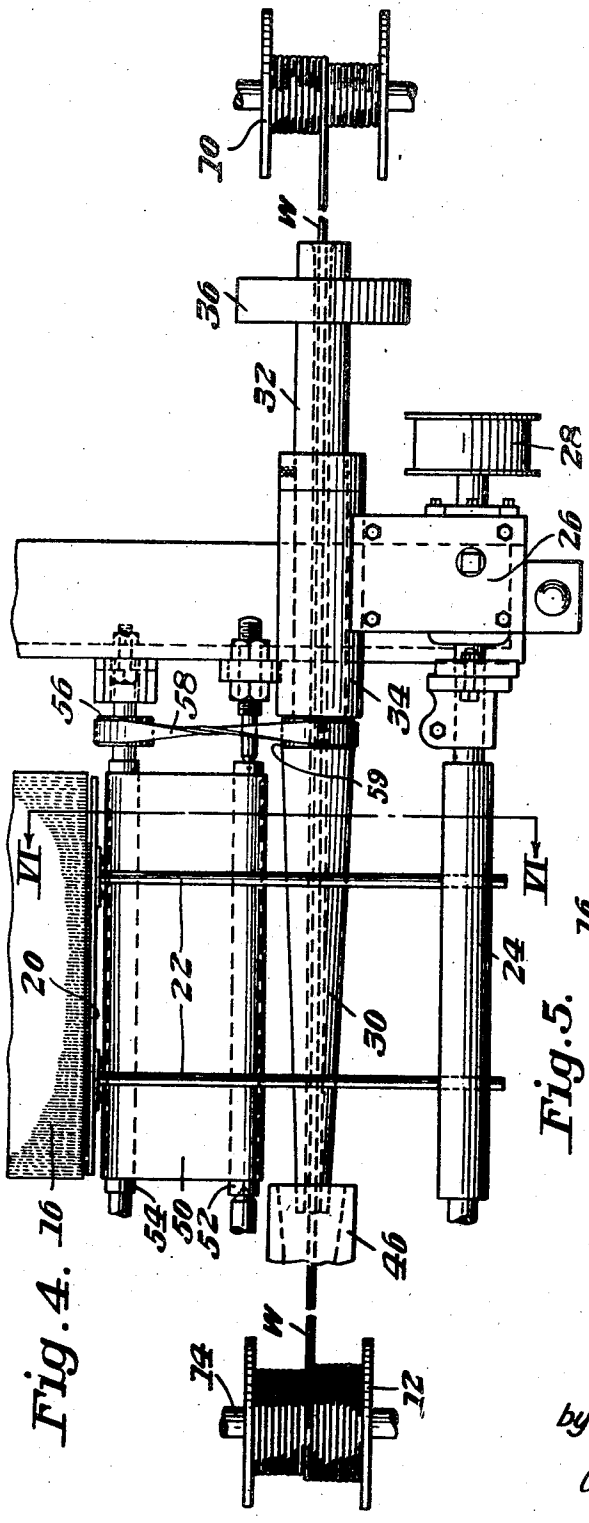


Fig. 4.

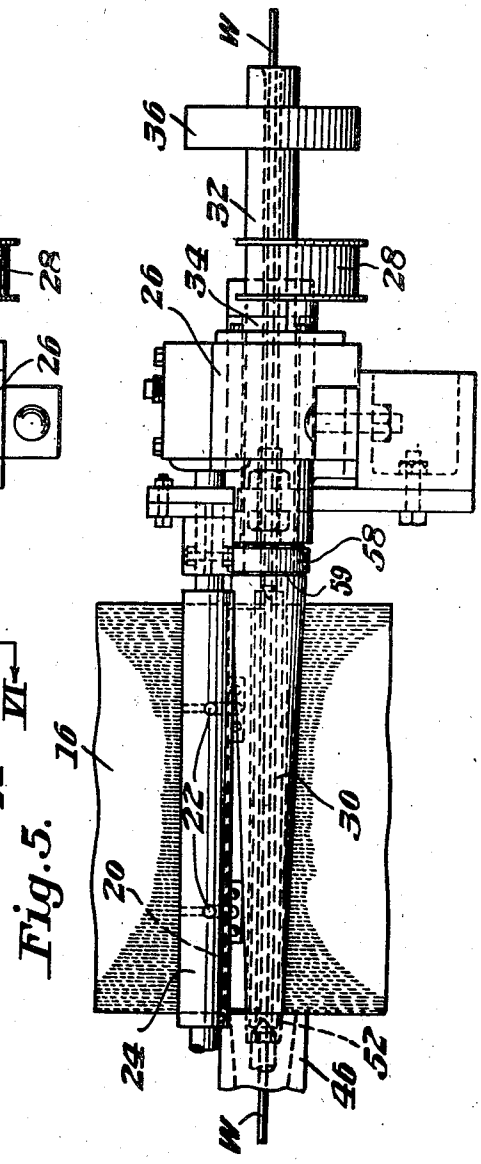


Fig. 5.

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Fig. 7.

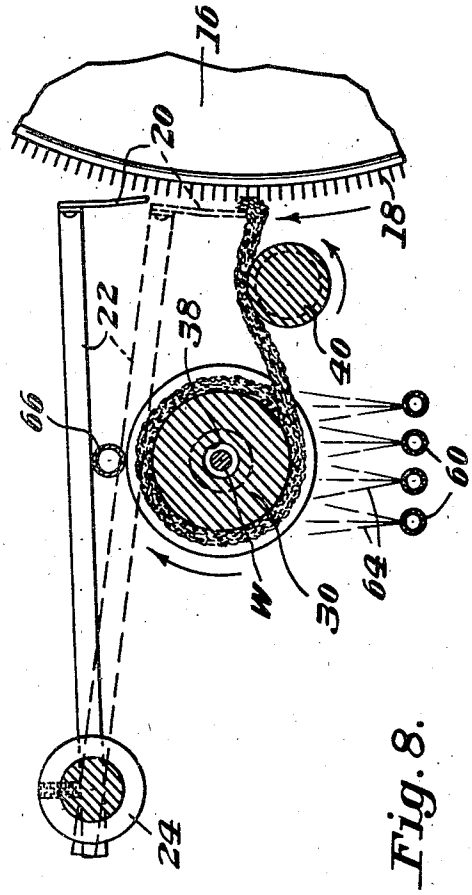
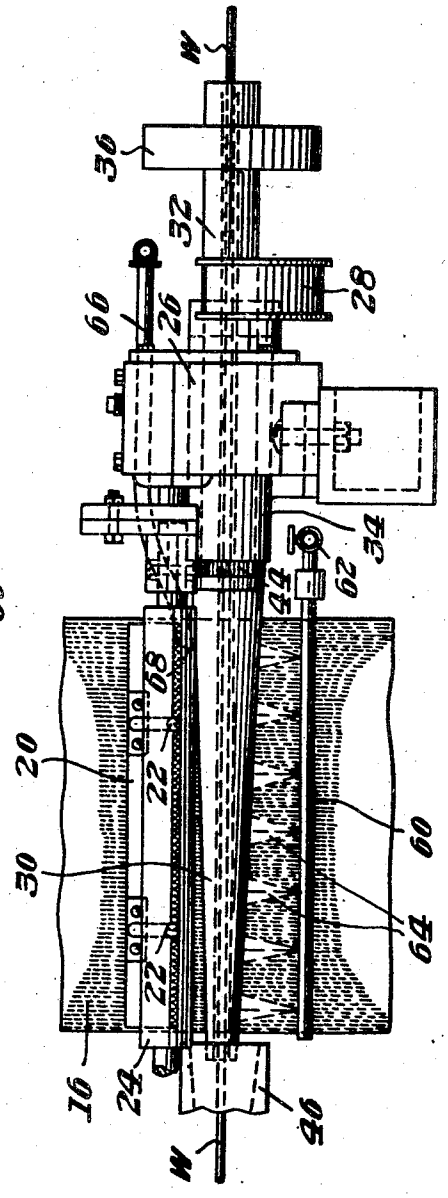


Fig. 8.



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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR APPLYING ASBESTOS TO WIRE

Kenneth A. Falconer, Auburn, Mass.

Application October 10, 1942, Serial No. 461,596

8 Claims. (Cl. 57—5)

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The present invention relates to an improved method and apparatus for applying fibrous material to an advancing wire and more particularly to applying asbestos fibers to an electric conductor and the like, an important object being to provide a practical method and apparatus for winding a fleece of asbestos fibers about an advancing conductor immediately after such a fleece of fibers has been stripped from the doffer roll of a conventional form of carding machine. An important object of the invention is to provide effective means for coiling a fibrous fleece around an advancing conductor without destroying the normal disposition of the fibers in the fleece which are arranged in substantially parallel relation by the carding machine, it being a particular object of the present invention to preserve the parallel relationship of the fibers. In a practical sense, this is regarded of importance since the density of the fleece is maintained by virtue of the fact that the fibers are not disentangled. A particular problem encountered in the wrapping of a fleece about an advancing wire or conductor is involved because such an asbestos fibrous fleece coming from a carding machine is inherently weak and incapable of withstanding any substantial tension. To this end I aim to interpose conveying means between the doffer roll of the carding engine and a hollow rotary cone which is adapted to coil the fibrous fleece around the conductor.

It is broadly old in the prior art relating to means for covering electric conductors to provide means for transferring a fibrous sheet-like fleece of cotton directly from a carding machine to a rotatable device adapted to apply such fleece to the conductor. Such idea is broadly shown in an old patent granted to John Robinson, No. 529,411, dated November 20, 1894, but so far as I am aware, the apparatus of the Robinson patent has never been successfully demonstrated and experience has shown that apparatus which works satisfactorily with cotton will not necessarily suit when handling asbestos fibers. For handling asbestos fibers I deem it highly desirable to interpose transferring means between the carding machine and the device which applies the fleece to the conductor. It has been heretofore proposed to strip asbestos fibers from the doffer roll of a carding machine to destroy their parallelism and to drop such fibers in a haphazard manner in such a way that they become entangled and then coiled around an advancing conductor. Such a machine is shown in Obermaier Patent No. 2,131,598, dated September

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27, 1938. The present invention aims to improve over this practice by preserving the parallel relationship of the fibers in the fleece imparted thereto by the usual clothing of the doffer roll of the carding mechanism.

As will be more fully apparent as the description proceeds, the present invention provides an improved method involving advancing a conductor lengthwise while continuously feeding a sheet-like fleece of loosely associated substantially parallel fibers of asbestos in a direction approximately normal of the line of travel of the conductor, exerting a combined longitudinal and centripetal force on the fleece whereby it is both compressed circularly and advanced longitudinally, but being supported out of contact with the advancing wire, whereupon the thus applied fleece is further compressed and condensed directly around and in contact with the wire in such a way that the substantially parallel association of the fibers of the fleece is not disrupted to any material extent, thus the density of the fleece is not lessened by fiber disentanglement as contemplated in the above mentioned Obermaier patent. The invention also consists further in the provision of a novel combination of mutually interdependent instrumentalities effective to carry out the method above described.

For complete understanding of the invention, reference should be made to the accompanying drawings, the following detailed disclosure and the appended claims.

In the drawings:

Figure 1 is a plan view of the principal parts of apparatus for carrying out the novel method;

Figure 2 is a front elevation thereof;

Figure 3 is a section on line III—III of Figure 1;

Figure 4 is a plan view similar to Figure 1 illustrating a modification;

Figure 5 is a front elevation of a part shown in Figure 4;

Figure 6 is a vertical section taken on line VI—VI of Figure 4;

Figure 7 is a view similar to Figure 3 illustrating a modification including pneumatic means for buoyantly supporting the fibrous fleece;

Figure 8 is a view similar to Figure 2, showing the front elevation of the parts illustrated in Figure 7.

Referring in detail to the drawings, a cable or electric conductor wire such as indicated at *w* in the drawings is adapted to be withdrawn from a supply reel 10 by means of a draw-off drum 12 carried by a shaft 14 driven from any suitable

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source of power. The drum 12 is effective to feed or advance the wire or cable *w* longitudinally in a continuous manner in juxtaposition to the peripheral surface of the doffer roll 16 of a conventional form of carding mechanism which is provided on its exterior with conventional fine wire teeth 18 known as the carding clothing. The carding machine has delivered thereto a supply of asbestos fibers in suitable form. This fibrous supply is acted upon in the conventional manner by the carding machine so as to produce a sheet-like fleece of asbestos in such a way that the elemental fibers thereof are arranged in substantial parallelism. This asbestos sheet-like fleece is stripped from the doffer roll 16 by a conventional form of carding machine comb 20 secured to the outer ends of arms 22 carried by a shaft 24 which is oscillated by a known form of vibrating mechanism which is enclosed in a housing 26. Since this vibrating mechanism constitutes no part of the present invention, it is not further illustrated, suffice to say, that motion is transmitted thereto by a pulley 28 operably connected in any suitable manner with the carding mechanism drive.

A hollow cone-like member 30 is secured to the extremity of a hollow sleeve 32 which is rotatably mounted in a suitable bearing 34, the sleeve being continuously rotated by a pulley 36 connected in any suitable manner with the drive for the carding machine. As the carding machine is operated it will be understood that the comb 20 above referred to will be intermittently vibrated and the cone will be continuously revolved. The sleeve 32 and cone 30 are provided with an aligned axial passageway 38 through which the wire or cable *w* is advanced longitudinally. In the embodiment of the invention shown in Figures 1 to 3, inclusive, as the fleece is stripped from the doffer roll 18 it is received by a transfer member 40. Thus there is no haphazard dropping of fibers as taught by the Obermaier patent, nor is there any disentanglement, it being a particular feature of the present invention to provide an operative means for transferring the fleece with the fibers thereof in the same parallel relationship which they occupy while on the doffer roll of the carding machine. In this embodiment of the invention the transfer member 40 takes the form of a rotating cylinder of small diameter which turns in a direction opposite to the direction of rotation of the doffer roll 16 as will be apparent from the arrows in Figure 3. This transfer member 40 carries a spur gear 42 which meshes with a similar gear 44 secured to the sleeve 32. Thus it is apparent that the transfer member 40 rotates in a direction opposite to the direction of rotation of the cone 30 as indicated by the arrows in Figure 3.

The rotary motion of the transfer member 40 delivers the fleece to the lower portion of the rapidly rotating cone 30. The action is such that the frictional drag imparts a centripetal force to the fibers of the fleece, thus tending to draw them inwardly toward the axis of rotation of the cone while at the same time the rotary motion of the cone tends to advance the fleece longitudinally in the same direction as that in which the conductor is traveling under influence of the wire feeding action exerted by the capstan 12.

Located in juxtaposition to the small end of the cone 30 there is rotatably mounted a whirler die 46 mounted in suitable bearings and driven from any suitable source of power. This whirler die has a central opening 48 therein which converges in the direction of travel of the advancing wire. The rotary action of this whirler die is effective to compress the fibers of the fleece circularly around the exterior of the advancing conductor and also to influence the longitudinal motion of the fibers covering the wire. In Figure 3 of the drawings the stipple showing is an attempt to illustrate the action of stripping the fleece from the doffer roll and supporting it while en route therefrom over the transfer member 40 to the rotating hollow cone which is effective to cause an initial compression and impart at least some degree of longitudinal feeding movement to the fibrous mass. It is to be understood, however, that the feeding movement of the fibrous mass, once it is arranged in wrapped relationship to the advancing conductor, is effected jointly by the cooperation of the rotating cone, and the rotating whirler die 46 in cooperation with the feeding movement imparted by the rotating capstan 12.

In the modification illustrated in Figures 4, 5 and 6, the parts cooperate in substantially the same manner as above set forth with the exception that in this embodiment of the invention the means for transferring the fibrous fleece from the doffer roll 16 to the rotating cone 30 comprises a conveyor belt 50 which is trained around supporting pulleys 52 and 54. Mounted on the supporting shaft for the pulley 54 there is also a pulley 56 which is connected by a crossed belt 58 with a pulley 59 secured to the sleeve 32. As thus arranged it is apparent that as indicated by the arrows in Figure 6 when the cone rotates clockwise the pulleys 52 and 54 will be driven in counterclockwise direction, thus causing the upper stretch of the conveyor belt 50 to travel in a proper direction from a region adjacent the doffer roll toward the rotating cone 30 so as to thus effectively support the flimsy fibrous fleece and positively feed it into a position for cooperative engagement with the rotating cone.

In the modification shown in Figure 7 the parts are arranged as in Figure 3, but in addition thereto, I here provide pneumatic means for buoyantly supporting the fleece while it is being transferred from the conveyor member 40 to the underside of the rotating cone 30. To this end I have shown in this figure a plurality of parallel pipes 60 which are approximately coextensive in length with the cone 30, the pipes being connected with a header 62 leading to a suitable source of compressed air, the upper portions of the pipes being perforated so as to permit the emission of air jets 64 therefrom. In this modification I have also illustrated an air pipe 66, the outlet orifice 68 of which is in the form of a nozzle located near the butt or large end of the cone 30. The pipe 66 is connected with the same source of supply as that to which the pipes 60 are connected and the function of the jet of air discharged from the nozzle is to assist in advancing the flimsy fibrous fleece longitudinally along the rotating cone 30. It is to be understood that the mechanism described can be operated without the use of the pneumatic means shown in the modification of Figures 7 and 8 and the use of this pneumatic means is contemplated chiefly when applying relatively heavy fibrous coating to the advancing conductor.

While I have described quite precisely a preferred method and apparatus, the practicability of which has been demonstrated in practice on a commercial scale, it is not to be construed that I am limited thereto since various modifications

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may be made by those skilled in the art without departure from the invention as defined in the appended claims.

I claim:

1. In the manufacture of insulated electric conductors the method which comprises advancing a conductor lengthwise, continuously feeding a fleece of loosely associated substantially parallel fibers of asbestos in a direction approximately normal to the line of travel of said conductor, exerting a combined longitudinal and centripetal force on the fleece whereby it is compressed circularly and advanced longitudinally while supported out of contact with the advancing wire and then circularly compressing the thus condensed fibrous mass directly around the wire whereby the substantially parallel association of the fibers of the fleece is not disrupted to any material extent so that the density of the fleece is not lessened by fiber disentanglement.

2. Apparatus for applying asbestos fiber to an electric conductor comprising means for advancing the conductor lengthwise, carding means for forming a fleece of asbestos whose fibers are disposed in substantially parallel relations, a means interposed between the carding means and the traveling conductor for supporting and transversely feeding the fleece as it is delivered by the carding means, a hollow rotary member through which the conductor is fed effective to coil the fleece and advance it longitudinally about the advancing conductor while out of contact therewith, and means for compressing the fibrous fleece about the advancing conductor.

3. Apparatus for applying asbestos fiber to an electric conductor comprising means for advancing the conductor lengthwise, carding means for forming a fleece of asbestos whose fibers are disposed in substantially parallel relation, a means interposed between the carding means and the traveling conductor for supporting and transversely feeding the fleece as it is delivered by the carding means, a hollow rotary member through which the conductor is fed effective to coil the fleece and advance it longitudinally about the advancing conductor while out of contact therewith, and a rotating die having a converging bore effective to compress the fibrous fleece about the advancing conductor.

4. Apparatus for applying asbestos fiber to an electric conductor comprising means for advancing the conductor lengthwise, carding means for forming a fleece of asbestos whose fibers are disposed in substantially parallel relation, transfer means for positively feeding said fleece transversely of the line of travel of said conductor, a hollow rotary cone through which the conductor travels effective by its rotary motion to coil the fleece received from the transfer means and to exert a longitudinal feeding movement thereto,

and a rotary die having a central bore therein converging in the direction of travel of the conductor and effective to compress the fibers of the fleece about the conductor whereby the substantially parallel association of the fibers of the fleece is not disrupted to any material extent by disentanglement.

5. Apparatus for applying asbestos fiber to an electric conductor comprising means for advancing the conductor lengthwise, carding means for forming a fleece of asbestos whose fibers are disposed in substantially parallel relation, means interposed between the carding means and the advancing conductor for positively supporting the fleece as it is delivered by said carding means, a hollow rotary member through which the conductor is fed effective to coil the fleece and advance it longitudinally about the advancing conductor while out of contact therewith, and means for compressing the fibrous mass of the fleece about the advancing conductor.

6. Apparatus for applying asbestos fiber to an electric conductor comprising means for advancing the conductor lengthwise, carding means for forming a fleece of asbestos whose fibers are disposed in substantially parallel relation, a positively driven conveyor means interposed between the carding means and the advancing conductor for supporting the fleece as it is being delivered by said carding means, a hollow rotary member through which the conductor is fed effective to coil the fleece and advance it longitudinally about the advancing conductor while out of contact therewith, and means for compressing the fibrous fleece about the advancing conductor.

7. Apparatus for applying asbestos fiber to an electric conductor comprising means for advancing the conductor lengthwise, carding means for forming a fleece of asbestos whose fibers are disposed in substantially parallel relation, means for stripping the fleece from the carding means, and pneumatic means for maintaining a stratum of air below the advancing conductor effective to buoyantly support the fleece as it is being stripped from said carding means.

8. An apparatus of the class described comprising, means for longitudinally advancing a wire, means for feeding a fleece of loosely associated substantially parallel fibers in a direction approximately normal to the line of travel of said wire, a rotary hollow member through which the wire passes and which is effective to coil said fleece and advance it longitudinally, means for pneumatically supporting the fleece while it is en route to said hollow member and rotary means for compressing the fibrous fleece about the wire as it emerges from said rotary hollow member.

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