Dec. 31, 1929. E. SLADE 1,741,443

STRAND AND BRAKE LINING AND METHOD OF MAKING THE SAME

Original Filed Feb. 20, 1924

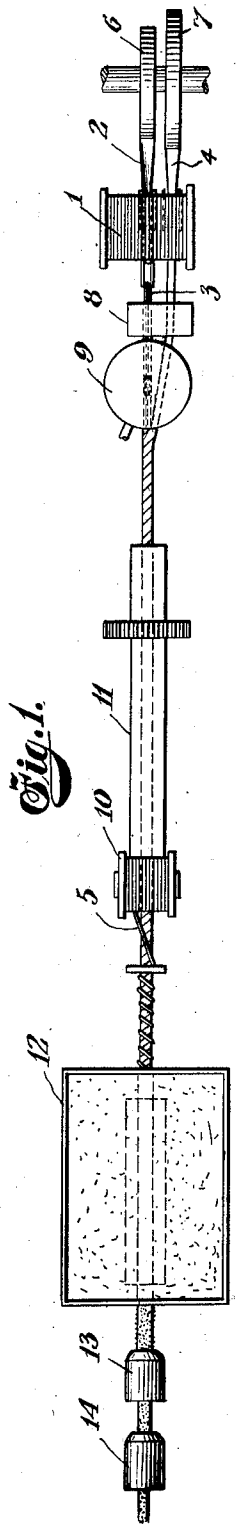


Fig. 1.

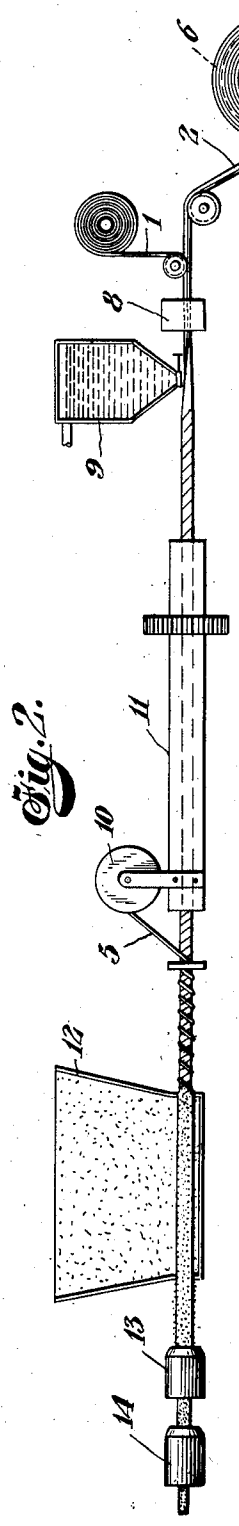


Fig. 2.

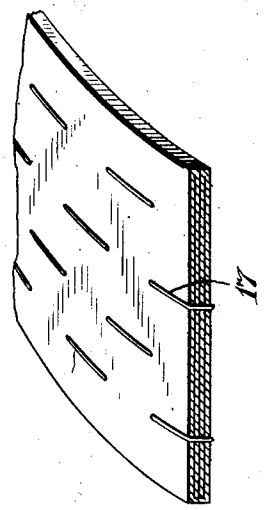


Fig. 5.

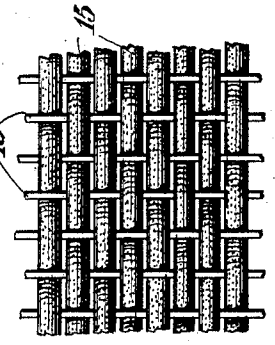


Fig. 4.

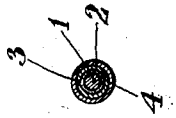


Fig. 3.

INVENTOR
Edward Slade
BY
Ramsay Hoguet
ATTORNEY

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UNITED STATES PATENT OFFICE

EDWARD SLADE, OF NEW YORK, N. Y.

STRAND AND BRAKE LINING AND METHOD OF MAKING THE SAME

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This invention relates to the production of a friction lining and resides particularly in the method of producing the lining and the component parts thereof as well as in the lining and parts themselves.

The invention contemplates the production of a lining which includes metal interwoven with lubricant impregnated fibrous material and contemplates further the production of a strand to be used in the weaving of the lining which strand is, during formation, impregnated with a compound of such character that the strand will retain its pliability for sufficient time after formation to permit its being woven with the greatest facility and with the best results.

In the drawing I have shown for the purpose of illustrating the application of my invention, one embodiment thereof wherein

Fig. 1 is a diagrammatic view showing one manner of carrying out the method,

Fig. 2 is a diagrammatic side view of the arrangement shown in Fig. 1, and

Fig. 3 is a detail showing the relative location of the covering elements immediately after the application of the two elements to the core, and

Fig. 4 is a view showing a fragment of one form of cloth used in the formation of the lining, and

Fig. 5 is a fragmental view showing a portion of a brake lining made in accordance with this invention.

Considering first the method of making the strand used in the formation of the lining a core 1 is fed longitudinally and, preferably, in a rectilinear path, under sufficient tension to hold it taut. A strip 2, preferably of fibrous material such as asbestos, is fed in the line of the path of travel of the core and is, upon meeting the core, given a transverse curve to form a sheathlike cover for the core with an opening 3 at its top which opening is formed by the spacing of the adjacent edges of the strip and is illustrated in Fig. 3 of the drawing.

An adhesive compound is fed to the opening 3 so that it lodges in the space between the core and the sheath and will thus impregnate the material of the sheath, leaving, however, an excess of the compound after the thorough impregnation or saturation of the sheath. This compound contains a vehicle having at least one fraction with a boiling point such that it will volatilize only upon the application of high temperatures and not at atmospheric temperatures. Further, the vehicle may comprise several fractions some of which, at least, will volatilize at atmospheric temperatures and under atmospheric pressure. When the compound contains a vehicle having fractions that will volatilize at different temperatures there will be sufficient volatilization of the vehicle at atmospheric temperature to cause the "setting" of the adhesive in a relatively short time and yet insufficient volatilization to cause the compound to harden completely. Thus the retention of the pliable nature of the strand is insured due to the retention of the less volatile fractions of the vehicle, and as a consequence ease and facility of weaving the strand into a cloth is insured. As examples of adhesive compounds which may have the fractional volatility referred to, the following may be used: a compound composed of a mixture of pulverized hydrocarbons mixed with a carbonizing vegetable oil and the mass dissolved in benzol and gasoline in proper proportions, or a compound composed of a liquid cellulose acetate in which the solvent is of a volatile nature, or other suitable bituminous compounds that are soluble in benzol and gasoline.

Preferably immediately after the application of the compound to the sheath covered core, a second covering strip 4, preferably also of fibrous material such as asbestos, is fed to the sheath covered core at an angle to the line of travel of the latter. This strip is given a transverse curvature similar to that which the strip 2 receives but because of the angle of its application to the sheath covered core it covers the opening 3 between the edges of the applied strip 2, as shown in Fig. 3.

The adhesive compound having been applied in quantities in excess of that necessary

to thoroughly impregnate or saturate the first strip 2 there still remains, after the application of this strip, sufficient material to thoroughly impregnate or saturate the strip 4 and insure its adhesion to the strip 2. Of course, the feeding of this adhesive may be controlled as will so that more or less may be fed, as desired, there being, however, considerable advantage in having only sufficient of the compound fed to the strips to thoroughly impregnate the strips leaving only a slight excess since this will facilitate the subsequent treatments.

A binding element 5 is applied to the thus strip covered core 1 in convolute form, the point of application of the element being fixed and the element being preferably applied by the travel of the binding element supply around the moving strip covered core.

The application of the binding element 5, which is preferably under controllable tension, to the core causes the strips 2 and 4 to assume a convolute form on the core with the convolutions of both of the strips running in the same direction and the convolutions of the binding element running in an opposite direction so that the binding element will not at any point coincide with the edge of the outer convolute strip, but will, throughout its entire application, intersect this edge.

Subsequent to the application of the binding element 5, the thus formed strand is still in a tacky condition with a slight excess of the adhesive compound and while still in this condition a lubricant bearing composition, preferably in a dry condition and in the form of a powdered asbestos and powdered graphite, is applied to the outer surface this compound adheres to the tacky surface of the strand, covering the binding element and itself becoming impregnated with the excess of the adhesive compound. The strand coated with this lubricant bearing composition is sized and compacted without, however, causing the volatilization of the portion of the vehicle which is at that time retained in the compound and volatile only under the application of high heat.

The strip 2 may be fed to the traveling core 1 from a supply 6 while the strip 4 may be fed from the supply 7 arranged on the same axis of rotation. The curvature of the strips is imparted thereto by dies 8 and the adhesive is applied by suitable means such as a pressure supply 9. The binding element 5 may be supplied from a spool 10 mounted for rotation on a rotatable hollow shaft 11 through which the core with the two strip covers passes before the application of the binding element.

The lubricant bearing composition may be supplied from a suitable supply such as 12 through which this strand is drawn and the coated strand may be sized and compacted by suitable dies 13 and 14.

The resulting strand is then woven or knitted into a fabric which may be used in the formation of a friction lining. When it is used in the formation of a folded woven brake lining, for instance, it may, because of its characteristics and the facility with which it may be handled in weaving, be used as either the warp or weft strands or both. When it is used as only the weft strand as shown at 15 in Fig. 4 the warp strands are made of wire 16, but when it is used for both the warp and weft, of course, the wire warp 16 is replaced by this particular strand.

The fabric thus formed is folded into the form shown in Fig. 5 and compressed, preferably without the application of heat. The thus compressed lining is then subjected to further compression with the application of heat which heat is of sufficient degree to drive off the remaining volatile constituents of the adhesive compound and to cause the thorough impregnation of the entire lining with the lubricant. The result is a hard lubricant impregnated brake lining comprising metal and fibrous material in which the laminations may, if desired, be stitched as shown at 17 in Fig. 5.

It will be obvious that until the volatile constituents of the adhesive compound are driven off in the final heating of the formed lining the strands retain their pliable characteristics which facilitates the weaving of the cloth and makes it unnecessary to weave the cloth immediately after the formation of the strand since the strand will retain its pliable nature until the volatile constituents of the vehicle are driven off by the application of heat after the formation of the lining.

What I claim is:

1. A method of making a strand which consists in applying a strip of fibrous material to a core in sheathlike form, applying an adhesive to the space between the applied strip and the core, applying a second strip of fibrous material over the first strip in convolute form, applying a convolute binding element over said last mentioned strip, and applying a dry lubricant bearing compound over said binding element and outer strip.

2. A method of making a strand which consists in applying a strip of fibrous material to a core in sheathlike form, applying an adhesive to the space between the applied strip and the core, applying a second strip of fibrous material over the first strip in convolute form, applying a convolute binding element, applying a dry lubricant bearing compound over said binding element and outer strip, and sizing and compacting the thus built-up strand.

3. A method of making a strand which consists in applying a strip of fibrous material to a core in sheathlike form, applying a second strip of fibrous material over the first strip in convolute form, applying a dry lubri-

cant bearing compound to the second strip to envelop the same and applying an adhesive to the first strip prior to the application of the second strip in sufficient quantity to impregnate both strips and the lubricant bearing compound.

4. A method of forming a friction lining which consists in covering a core with fibrous material, impregnating the covering with an adhesive compound including a vehicle having at least one fraction volatile only at superatmospheric temperatures, weaving said strand into a fabric, forming and compressing the fabric and applying sufficient heat thereto to volatilize the fractions of the vehicle of the adhesive compound still remaining in the lining.

In testimony whereof, I have signed my name to this specification this 18th day of February, 1924.

EDWARD SLADE.