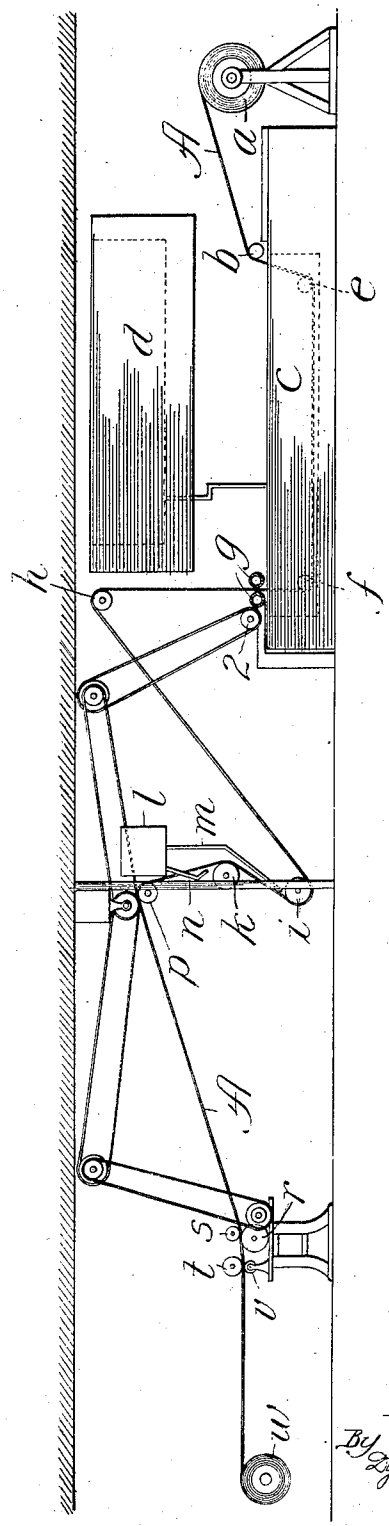
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No. 820,694. PATENTED MAY 15, 1906.

L. A. BOND.

WATERPROOF FABRIC.

APPLICATION FILED SEPT. 22, 1905.



Witnesses:
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UNITED STATES PATENT OFFICE.

LON A. BOND, OF LOGANSPORT, INDIANA, ASSIGNOR TO RUBBERTEX CLOTH AND PAPER COMPANY, OF LOGANSPORT, INDIANA, A CORPORATION OF INDIANA.

WATERPROOF FABRIC.

No. 820,694. Specification of Letters Patent. Patented May 15, 1906.

Application filed September 22, 1905. Serial No. 279,684.

To all whom it may concern:

Be it known that I, LON A. BOND, a citizen of the United States, residing at Logansport, in the county of Cass and State of Indiana, have invented a new and useful Improvement in Waterproof Fabrics, of which the following is a specification.

My object is to provide a flexible fabric of porous fibrous material—such as a textile fabric, rope, and the like—the fibers of which are rendered impervious to moisture and of increased strength and durability; and my invention is produced by subjecting the fibers to thorough saturation with molten asphalt in a highly-fluid condition to cause the asphalt to impregnate the fibers and, if desired, to fill out the pores or spaces betwen the fibers of the fabric.

It is necessary in the production of my new article of manufacture to employ asphalt such as may only be readily obtained, so far as I am aware, from crude petroleum having an asphalt base, and which is a material that has become known commercially, at least, only during recent years. I have produced the best results thus far with highly-fluid molten asphaltic residuum from crude petroleum having an asphalt base approximating ninety-nine and nine-tenths per cent. pure and having a melting-point approximating 350° Fahrenheit. I have discovered, for example, that by thoroughly saturating twisted strands of hemp, jute, or the like with highly-fluid molten asphaltic residuum from crude petroleum having an asphalt base, as stated, the strands when twisted together form a cable of much greater strength than when not thus saturated, that the asphalt remains pliable under a comparatively low temperature, does not soften and become sticky under the heat of the sun, and tends to preserve the cable against rotting either in fresh or salt water, and that subjection of the cable to water for any length of time is beneficial, rather than otherwise, and enables it better to withstand strain and wear.

Textile fabrics treated with asphaltic residuum from crude petroleum having an asphalt base to thoroughly saturate the fibers and fill the pores or spaces between the fibers are rendered absolutely waterproof and possess advantages for many purposes over the same fabrics rendered waterproof by means of rubber, tar, or any other usual waterproofing material. Sacks formed, for example, of burlap or the like treated in accordance with my invention form very durable, inexpensive, and desirable receptacles for the shipment and handling of fertilizer, as the asphalt protects the fibers of the textile fabric against destruction by the acid constituents of the fertilizer.

In the manufacture of waterproof cloth, for example, I employ suitably-devised apparatus, which may be like that shown in the accompanying drawing.

The web or fabric A to be treated is in operation unwound from a roll *a* and passes over a guide-roller *b* and thence downward into a saturating-tank *c*, which may be, say, twelve feet in length. Asphalt of a high degree of purity, as stated, is subjected in a melting-tank *d* to a temperature of about 400° Fahrenheit, which temperature is too low to injure the fabric, but is high enough to render the asphalt very fluid. From the melting-tank the molten asphalt may be run into the saturating-tank as required to maintain the same supplied to a desired level. Means may, if necessary, be provided to heat the saturating-tank to maintain the temperature of the asphalt therein at all times well above its melting-point, which is about 350° Fahrenheit. Rollers *e f*, near the base of the tank, operate to guide the fabric and keep it submerged in the asphalt during nearly twelve feet of movement, long enough for thorough saturation. From the roller *f* the saturated fabric passes upward between a pair of squeezing-rollers *g*, which operate to remove all or as much as desired of the surplus asphalt from the fabric. From the squeezing-rollers the fabric may be caused to travel over rollers and across a drying-space for a time sufficient to cause the asphalt to dry and harden; but on leaving the squeezing-rollers the opposite surfaces of the fabric present after drying a dull and somewhat rough appearance, which it may be desirable to improve by passing the fabric between polishing-rollers. In the illustration the fabric passes from the squeezing-rollers over a roller *h* and thence across rollers *i* and *k*, which may be located as shown. Above the said rollers is shown a box *l* to contain a surface-drier in the form of a suitable powder, which may be

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pulverized soapstone or any desired silicious material, from which extend conducting-pipes *m n*, terminating over the respective rollers *i k* to sprinkle them with the powder when desired, the powder being transferred by the rollers to the opposite partially-dried slightly-plastic surfaces of the fabric.

From the roller *k* the fabric passes over a roller *p* and thence between two pairs of polishing-rollers. The first pair of polishing-rollers comprises a lower roller *r*, of large diameter, and an upper companion roller *s*, of smaller diameter. The second pair of polishing-rollers comprises an upper large roller *t* and a lower companion roller *v*, of less diameter. From the polishing-rolls the fabric passes to a reel or the like *w*, upon which it is wound for handling.

In the illustration power is supplied by a pulley 1 and transmitted through belts, as indicated, to the squeezing and polishing rollers. I prefer to provide squeezing-rollers so mounted as to be adjustable one with relation to the other, whereby their pressure against opposite sides of the web may be increased or diminished, as desired. They may be geared in driving relation to a pulley 2 to turn at the speed of travel of the web A, and I prefer that they be maintained at a temperature between 350° and 400° Fahrenheit by means of steam-pipes running through them, as indicated. The larger rollers rotate at the speed of forward movement of the web to carry the same along, while the smaller rollers rotate somewhat faster to rub against the surfaces of the web. By the time the web reaches the polishing-rollers the asphalt is sufficiently non-plastic to receive a polish, and this is effected by the rubbing action of the smaller rollers. The pressing and ironing of the web produced by the polishing-rollers compacts the asphalt in the pores of the web and gives a final uniform finish to the waterproofed fabric.

The squeezing-rollers may be adjusted to remove substantially all surplus asphalt, and thus prevent the formation of films or surface coatings. The saturation of the fibers and filling of the pores between them alone renders the fabric thoroughly waterproof without materially decreasing its flexibility. Of course the squeezing-rollers may be adjusted to decrease their pressure against the fabric and leave films or surface coatings of asphalt thereon, if desired.

Waterproof cloth made in accordance with my invention will not absorb water, will not crack, and will withstand a much higher temperature without becoming sticky than rubber cloth or cloth treated with tar, resin, or the like. By impregnating the fibers the asphalt tends greatly to strengthen them, which is not the case, to any such extent at least, when the fabric is treated with any other waterproofing material of which I am aware.

My improved article of manufacture may be used with advantage in many cases where rubber cloth or tarpaulin are now employed. The product is much less expensive than rubber cloth and may be subjected to rougher handling without danger of injury. The fabric may be very thin and be as strong and durable as much heavier tarpaulin.

Cloth rendered waterproof in accordance with my invention may be odorless and tasteless, and therefore very desirable for sacks to contain cement, flour, meat, or other materials which would be injuriously affected by moisture.

The object of sprinkling drying-powder upon the fabric, as described, is to prevent the surfaces of the fabric from adhering to the polishing-rollers in a manner to retard their action or do injury to the fabric. By employing suitable drying-powders of different colors different hues or shades of color may be given to the surfaces of the fabric.

What I claim as new, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a fabric composed of porous, fibrous material, having its fibers saturated or impregnated with asphaltic residuum from crude petroleum having an asphalt base.

2. As a new article of manufacture, a fabric composed of porous, fibrous material having its fibers saturated or impregnated and its pores between the fibers filled with asphaltic residuum from crude petroleum having an asphalt base.

3. As a new article of manufacture, a textile fabric composed of flexible, porous, fibrous material having its fibers saturated or impregnated with asphaltic residuum from crude petroleum having an asphalt base.

LON A. BOND.

In presence of—
A. U. THORIEN,
J. H. LANDES.