

UNITED STATES PATENT OFFICE

2,287,139

MATERIAL FOR MAKING RUBBER ARTICLES

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No Drawing. Application February 21, 1939,
Serial No. 257,659

5 Claims. (Cl. 154—2)

This invention relates to a woven fabric comprising heavy warp threads and fine weft threads that are made such that they become ineffective upon the application of heat and to the use of such a fabric in rubber articles such as tires.

An object of the invention is the economic and expeditious production of a cord tire or similar article requiring a fabric having ineffective weft threads in the finished product. Other objects of the invention will appear from the following detailed description.

In the manufacture of tires and other rubber articles there is desired a cord or rope fabric in which there is little or no drag of the weft on the warp. When the weft exerts an action upon the warp, the warp does not lie in a straight line but must flex to a certain extent over and under the weft threads. Also in the use of the article there is a continual flexing action in which the weft threads cut into the warp threads thus weakening same. The result of the bending of the cord or rope warp is to weaken the article allowing it to stretch, while the result of the cutting action of the weft on the warp is to lessen the durability of the finished article.

I have found that if a cord fabric is made with yarns of synthetic resins that are readily fusible as weft there is produced a fabric that is tough and holds its weave shape exceptionally well yet when incorporated with the rubber and subjected to vulcanizing temperatures its weft threads become inoperative allowing the cords of the warp to lie straight and in future flexing of the article there is no cutting action by the weft threads on the warp threads. This fabric will withstand the processing steps in the manufacture of rubber articles, wherein the fabric embedded therein is cut to shape and fitted into the rubber and otherwise handled, while remaining a tight durable fabric in which there will be no separation or overlapping of the cord or ropes forming the warp. For this purpose, a strong durable weft is required which, however, is reduced or disintegrated to an ineffectual non-injurious weft in the finished article.

According to this invention, the weft of the fabric is made of yarn comprising filaments or staple fibres of a synthetic resin having a melting point below 150° C. and preferably below 125° C., but in any case these yarns should fuse under the vulcanization conditions subsequently obtaining. While I prefer to employ yarns made of resins derived from the polymerization of vinyl compounds, such as polyvinyl acetate, the conjoint polymer of vinyl chloride and vinyl acetate,

the polyvinyl propionate, the formaldehyde or acet-aldehyde condensation product of partially saponified polyvinyl acetate, yarns made of other fusible resins may be made. Examples of such fusible resins are the fusible and soluble glyptal resins, the phenol formaldehyde resins, toluene sulphonamide-formaldehyde resins etc.

By the use of such weft yarns, there is thus produced a fabric that may be embedded in the rubber, that is firm and that may be handled and worked without a separation of the warp cords. Although the fabric is firm while being worked into an article after heat treatment of the article the weft threads are substantially destroyed leaving the properly placed cords of the warp properly embedded in the rubber and unaffected by the treatment that destroyed the weft threads.

The yarn of synthetic resin employed as weft may be of any suitable size, but is preferably of fine size, say from 45 to 150 denier.

The warp of the fabric may be formed of any desired type of material such as cotton, wool, silk, hemp, etc. This invention, however, is especially applicable to tire making wherein the fabric used contains a warp of heavy cotton cords or rope. The warp however may be yarns, threads, cords or ropes. Articles other than tires made of rubber or similar plastics that contain embedded fabric as a strengthening medium and are cured, vulcanized or set by the application of heat may be formed efficiently employing this invention, such as, for example, water hose, gasoline pump hose, water bags and containers and like objects.

The fabric may be woven in the manner and on the same machines as ordinarily used for weaving like fabrics. The fabric may be worked with the rubber or other similar plastic in the ordinary way and the article vulcanized or cured by application of heat. Thus automobile tires may be formed using the specially prepared fabric in the same way as when using other types of fabric. After formation of the tire it may be subjected to heat and pressure for the purpose of vulcanizing same. The temperature of vulcanization may be between 125° and 200° C. at which temperatures the resin fuses to destroy the weft threads. The weft threads become plastic and without strength while thus heated allowing the warp cords to assume a straight position. After cooling, the weft threads being somewhat disintegrated are without strength and exert no binding or cutting action on the warp cords. For the purpose of further describing the invention without desiring to be limited thereto the following example is given:

Example

A yarn made of filaments of a conjoint polymer of vinyl chloride and vinyl acetate having a melting point of 85-95° C. is woven as the weft thread into a warp consisting of heavy cotton cords to form a tie fabric. The fabric is worked with rubber into a tire that is vulcanized at 150° C., temperature and super-atmospheric pressure. The fabric is found to be rigid and the warp cords held firmly in place during the building of the tire. After vulcanization the fabric is found to consist of unaffected warp cords and strengthless ineffectual weft yarns.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. A material for making vulcanized rubber articles, comprising a shaped rubber composition having embedded therein a fabric, the weft yarns of which fabric comprise fusible synthetic resin that becomes ineffective at vulcanization temperatures.

2. A material for making vulcanized rubber articles, comprising a shaped rubber composi-

tion having embedded therein a fabric, the weft yarns of which fabric comprise fusible polyvinyl resin that becomes ineffective at vulcanization temperatures.

3. Cord fabric for use in the production of rubber tires, comprising a warp consisting of relatively heavy cords composed of material that does not become ineffective at vulcanization temperatures and a weft of yarns which comprise fusible synthetic resin that becomes ineffective at vulcanization temperatures.

4. Cord fabric for use in the production of rubber tires, comprising a warp consisting of relatively heavy cords composed of material that does not become ineffective at vulcanization temperatures and a weft of yarns which comprise fusible polyvinyl resin that becomes ineffective at vulcanization temperatures.

5. Cord fabric for use in the production of rubber tires, comprising a warp consisting of relatively heavy cords composed of material that does not become ineffective at vulcanization temperatures and a weft of yarns which comprise fusible synthetic resin comprising a conjoint polymer of vinyl chloride and vinyl acetate that becomes ineffective at vulcanization temperatures.

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