UNITED STATES PATENT OFFICE.

STEPHEN M. ALLEN, OF BOSTON, MASSACHUSETTS.

IMPROVED MANUFACTURE OF FELT.

Specification forming part of Letters Patent No. **37,559,** dated February 3, 1863.

To all whom it may concern:

Be it known that I, STEPHEN M. ALLEN, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in the Manufacture of Felting; and I do hereby declare that the following is a full and exact description of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

In the manufacture of felt by the methods heretofore practiced such materials have necessarily been employed as afforded in their natural condition a barbed or roughened surfaces and ends—that is, such projecting beards or filaments as would in the felting process become entangled or interlaced with each other, as this thorough intertwining of the fibers is the foundation of the whole felting operation, and without which a firm and solid body could not be produced; but the materials which afforded these requisites have hitherto been confined to those of which the first cost is considerable, such as wool, hair, fur, &c., and the introduction of foreign substances—such as flax, hemp, china-grass, and other long-stapled fibers shortened to a proper length by cutting for felting—with a view to the cheapening of the product, has been rendered practically impossible, except for the very coarsest and most inferior products, both from the absence of filaments or beards on their surfaces and ends to insure a strong and perfect adhesion to each other and to other felting substances and from the incapacity of the blunt ends of such fibers to absorb and retain colors. In fact any such fibers, when shortened by cutting, are too stiff and brittle to be practically available for felting, either when used separately or mixed with other materials.

In order to fully understand the purposes and results of my improvement, it is important to bear in mind that it is the bearded or filamentous properties of the fibers employed which are made use of to constitute felt. The fineness, softness, and strength of which, as well as its capacity to receive colors, &c., depend upon the number and fineness of the beards or filaments incorporated and interlaced with each other therein.

My improvements have for their object the producing of a felt by an entirely new combination of substances, which shall be cheaper, stronger, and possess a greater adaptability to receive and retain colors, varnish, paint, oil, japan, india-rubber, &c., than felt manufactured from the materials usually employed. These desiderata I effect by combining the fibers of wool, fur, &c., or any of the substances commonly used for felting with the fiber of flax, hemp, jute, silk, china-grass, or other similar long-staple fibers reduced to short lengths—not by cutting, which would leave such blunt ends as to render the production of a felt from them impossible—but by submitting them to a tensile strain, which will separate them into the length of fiber required. By thus operating upon the long-staple fibers a peculiar effect is produced, their fibrils being completely stranded and separated from each other, and leaving their ends in such a finely-divided state as to readily unite and interlace with each other and with other substances, subjecting them to any ordinary felting process. Thus by this mode of disintegrating and refining the fibers, bringing them into the exact condition of the more expensive materials, like wool, fur, &c., of which felt is usually composed, and producing from coarse substances which have hitherto been valueless for felting purposes fibrils which are excellently adapted to combine and interlace with each other and with ordinary felting stock.

The application of colors, varnish, india-rubber, &c., to felt made from substances thus prepared and felted is much more effective than to any product made from natural fibers or furs, because when the long-staple fibers are thus shortened by stranding their tubes are left open for the admission of the colors, the ends of the fibril resembling the ends of a stranded rope and acting like a brush to absorb and retain such liquids as may be applied to them. Moreover, their brush-like ends, thus saturated with color, glazing, &c., form, when drying, so many ties to bind the surrounding materials firmly together in one mass. It will be evident that long-staple fibers shortened simply by cutting could possess neither of these advantages of taking colors and interlacing themselves firmly with other fibers on account of the blunt shape of their ends.

The fineness and quality of the fabric pro-

duced by my improvements can of course be regulated at pleasure by stranding the ends of the long-staple fibers more or less by applying more or less tensile strain to them and the proportions of the stranded fibers, and the natural fibers, like wool, to be mixed together may be endlessly varied, according to the different purposes to which the felt is to be applied.

The mode by which I prefer to reduce and strand the long-staple fibers is to submit them to a tensile strain by means of rollers or other devices which will strain the fiber between two given points. This strain in the direction of the length of the fiber may be combined or not with torsion or other strains; but the effect must be such as to produce the stranded ends in as filamentous or brush-like a condition as possible. The fibers thus shortened and stranded may be then mixed with other felting materials—such as fur, wool, &c.—in any desired proportions and subjected to any of the well-known felting processes. The felt may then be colored, varnished, japanned, coated with india-rubber, or glazed, to which processes the felt made by my new mode is, as hereinbefore explained, peculiarly sensitive, by any proper method heretofore used for such purposes.

The fibers to be shortened and stranded may be subjected to a chemical process either before or after they are disintegrated for facilitating their separation into fibrils. Thus they may be subjected to the action of hot water or vapor, which will liberate their resinous matters, which will form small knobs or protuberances extending laterally across the fibers, and which will aid in causing their interlacing with and adhesion to each other.

Having thus described my improvement, what I claim as my invention, and desire to have secured to me by Letters Patent, is—

My improvement in the manufacture of felt, which consists in combining ordinary felting materials, like fur, wool, &c., with a short fiber made or reduced in such a manner from long-staple fibrous materials, like flax, hemp, jute, silk, china-grass, and similar substances, as to have the peculiarities hereinabove described, whereby when so combined they can be felted together by any suitable felting process.

STEPHEN M. ALLEN.

Witnesses:
JOSEPH GAVETT,
ALBERT W. BROWN.