W. H. UNDERWOOD.

METHOD OF MAKING METALLIC AND PLASTIC FABRICS.

APPLICATION FILED JUNE 13, 1911.

1,096,077. Patented May 12, 1914.

Fig. 1.

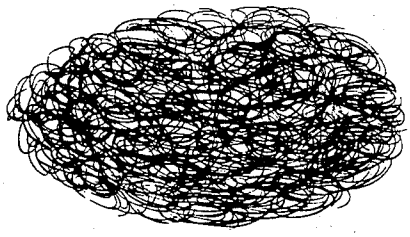


Fig. 2.

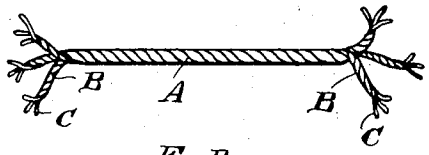


Fig. 3.

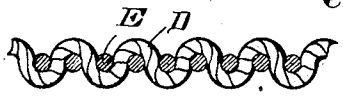


Fig. 4.

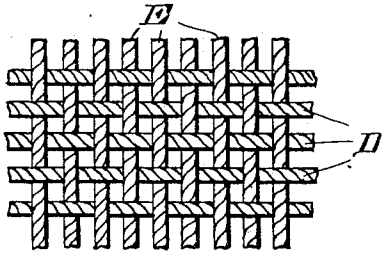


Fig. 5.

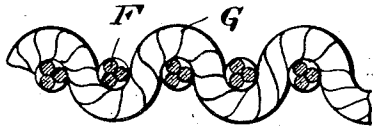


Fig. 6.

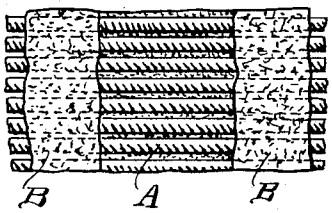


Fig. 7.



Witnesses

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METHOD OF MAKING METALLIC AND PLASTIC FABRICS.

1,096,077. Specification of Letters Patent. Patented May 12, 1914.

Application filed June 13, 1911. Serial No. 632,985.

To all whom it may concern:

Be it known that I, WALTER H. UNDERWOOD, a citizen of the United States, and resident of the city, county, and State of New York, have invented certain new and useful Improvements in Methods of Making Metallic and Plastic Fabrics, of which the following is a specification.

This application relates to the method of manufacturing metallic yarn and fabric described and claimed in my pending application Serial No. 592,004, filed November 12, 1910.

The invention will be described in connection with the accompanying drawings, in which,

Figure 1 is a representation of a mass of metallic fibers from which the yarn is spun; Fig. 2 is a representation of a piece of yarn made from a plurality of strands spun from metallic fibers; Fig. 3 is a transverse sectional view taken through a fabric woven from metallic yarn; Fig. 4 is a plan view of a portion of woven metallic fabric; Fig. 5 is a transverse sectional view of another form of fabric made from metallic yarn; Fig. 6 is a top plan view of a piece of compound fabric comprising a plurality of yarns embodied in plastic material; Fig. 7 is a transverse sectional view through Fig. 6.

I have discovered that fine metallic fiber cut or shredded from solid metal in the usual manner in which such material is made, or any metallic fiber having rough or serrated edges in contradistinction to smooth wires, may be spun into yarn. One form of metallic fiber suitable for spinning into a yarn is known commercially as metallic wool, and if made from steel this material is known as steel wool. The fibers of such metallic wool are ordinarily more or less irregular in cross section and the edges are serrated or roughened in the nature of wool or hair, making it possible to spin the fibers into yarn.

Fig. 1 represents a mass of metallic wool from which my metallic yarn may be spun, and Fig. 2 represents a compound yarn A, comprising in this instance three strands B, each of which is made from three primary strands C of metallic yarn.

Fig. 3 represents a sectional view of a fabric woven from yarns D and E, and it is to be understood that the fabric may either be woven from single strands of yarn or a plurality of strands twisted, as desired.

Fig. 4 is a plan view of Fig. 3 showing a simple woven fabric comprising the yarns E and D. Fig. 5 is a transverse sectional view of a fabric woven from compound yarns F and G.

Ordinarily shredded metal suitable for my improved process is obtained from the shredding machines in irregular tangled condition, such as illustrated in Fig. 1, and it must be carded and drawn out into roving before it can be spun into yarn. Preparatory to carding I anneal or soften the fiber to make it pliable and permit of its being carded and spun without breakage and also to relieve the condition of stress produced by shredding and put the fiber in such condition that it will not tend to unravel when spun and woven. Of course some metal when shredded is sufficiently pliable to permit of being carded without annealing and in some instances such metal may be spun as it comes from the shredding machine, thus avoiding the necessity of carding. After being carded and spun the metallic yarn so formed may be woven into fabric, as shown in Figs. 4 and 5. The metallic fabric may then be hardened in any usual way or tempered if desired to any degree of hardness, or the yarn may be treated in the same way, if intended for use without weaving.

Generally speaking my improved method consists, first, in shredding metal from a solid mass so as to produce elongated filaments having roughened or serrated surfaces, then softening the fiber so formed by annealing or otherwise, then carding the fiber and spinning it into yarn, then weaving or knitting the yarn into fabric, and finally hardening or tempering the fabric as may be desired, or the yarn may be hardened and tempered if desired and used for various purposes without weaving it.

As shown in Figs. 6 and 7, the yarn may be used in plastic compositions without weaving, although in most cases the woven or knitted fabric will be used in such compositions. When used without weaving or knitting the strands of yarn are preferably arranged parallel and at regular intervals as the particular use may require. They may be arranged in one direction or layers crossing each other, depending upon the thickness of the compound fabric to be produced. When metallic yarn or fabric is to be used for reinforcing or increasing the

wearing properties of plastic materials, the yarn or fabric should be hardened or tempered to the desired degree before it is associated with the plastic material. By embedding hardened steel fabric, for instance, in rubber or similar plastic material, a pliable fabric having superior wearing qualities may be produced.

The metallic yarn and fabric are useful for many purposes in the arts and manufactures, for instance, when embedded in plastic material, they add very greatly to its strength and wearing qualities. The metallic fabric embedded in or combined with rubber or similar material is useful for floor coverings, stair treads, packing for joints, and treads for solid and pneumatic vehicle tires. When combined with suitable material the metallic fabric makes excellent surfaces for vehicle brakes, clutches and other devices requiring frictional contacting surfaces. The yarn and fabric may be made of any suitable metal or alloy and when made of steel or other metals which permit of hardening may be tempered to any desired degree of hardness.

The yarn may be spun from the metallic wool by carding the same, or the wool may be obtained in such form that carding is unnecessary. The yarn when spun may be used as it comes from the spinning machine or it may be drawn or compressed in any suitable manner to increase the density and smoothen the surface. If desired the metallic wool may be spun or twisted together with cotton or other fiber to make a compound yarn or thread, or the metallic yarn may be interwoven with cotton, asbestos, or other yarn. This yarn possesses the peculiar electrical property of varying its resistance when the yarn is agitated, or when placed under compression, tension, or torsion, due, probably, to variation in the extent of contacting surfaces of the fibers.

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

1. The method of converting a solid metallic mass into yarn or fabric, which comprises shredding the metal into metallic fiber having rough or serrated edges, annealing or softening the same, and subsequently spinning it into yarn.

2. The method of converting a solid metallic mass into yarn or fabric, which comprises shredding the metal into metallic fiber having rough or serrated edges, annealing or softening the same, then spinning the same into yarn, then forming the yarn into fabric, and finally hardening and tempering the fabric.

3. The method of making compound plastic articles which consists in spinning shredded metal into yarn, hardening the yarn to any desired degree, and incorporating the hardened yarn in plastic material.

4. The method of making compound plastic articles which consists in spinning shredded metal into yarn, weaving the yarn into fabric, hardening the fabric to any desired degree and incorporating the hardened fabric in plastic material.

5. The method of making metallic yarn or fabric from a solid metallic mass which consists, successively, in shredding the mass into fibers, softening or annealing the fibers, spinning, or carding and spinning such fibers into yarn, making a fabric of such yarn, hardening, or hardening and tempering such yarn or fabric at any convenient stage after the yarn is spun, and finally combining such yarn or fabric with plastic material.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER H. UNDERWOOD.

Witnesses:
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J. J. GIBSON.