W. H. UNDERWOOD.

COMPOUND PLASTIC MATERIAL.

APPLICATION FILED NOV. 12, 1908.

1,012,030.

Patented Dec. 19, 1911.

Fig. 1

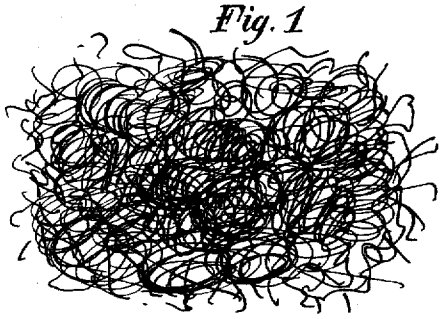


Fig. 2

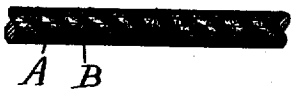


Fig. 5

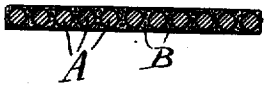


Fig. 3

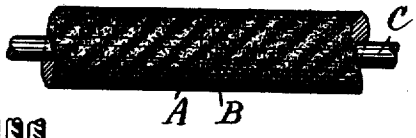


Fig. 7

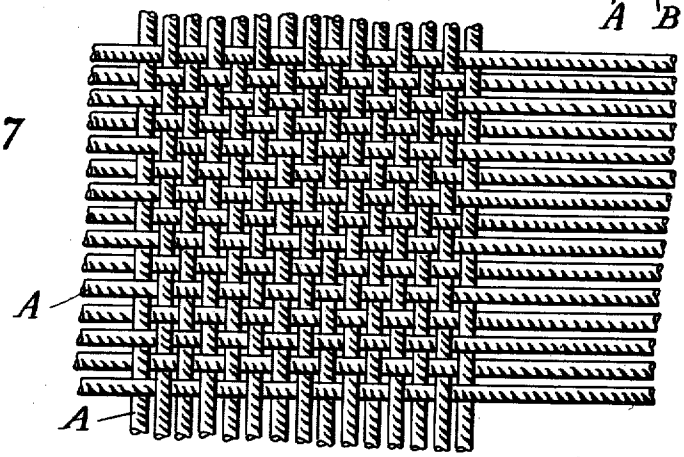


Fig. 8

Fig. 9

Fig. 4

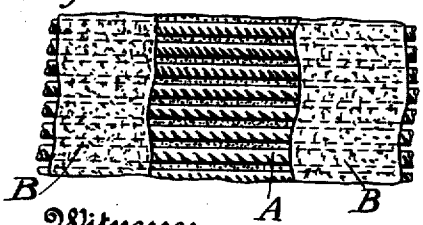
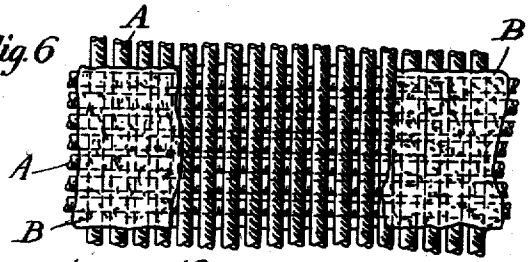


Fig. 6



Witnesses
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Walter H. Underwood Inventor
By his Attorneys Pennie & Ogden

UNITED STATES PATENT OFFICE.

WALTER HUNNEWELL UNDERWOOD, OF NEW YORK, N. Y.

COMPOUND PLASTIC MATERIAL.

1,012,030. Specification of Letters Patent. Patented Dec. 19, 1911.

Application filed November 12, 1908. Serial No. 462,225.

To all whom it may concern:

Be it known that I, WALTER H. UNDERWOOD, a citizen of the United States, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Compound Plastic Materials, of which the following is a specification, accompanied by drawings.

This invention relates to a new compound plastic material, and the objects of the invention are to increase the usefulness of various plastic compositions and make valuable the useful properties of shredded metal, which is also known as metallic wool.

Referring to the accompanying drawings, Figure 1 is a view of a mass of the metallic wool; Fig. 2 is a longitudinal view of a piece of yarn spun from the metallic wool and impregnated with gum or other plastic material; Fig. 3 is a longitudinal view of a yarn wound about a suitable core and impregnated with gum or other plastic material; Fig. 4 is a top plan view of a piece of material comprising a plurality of yarns embedded in plastic material; Fig. 5 is a transverse sectional view through Fig. 4; Fig. 6 is a top plan view of a plurality of crossed yarns embedded in plastic material; Fig. 7 is a plan view of a fabric made from metallic yarns or threads; Fig. 8 is a sectional view of a metallic fabric made from yarns or threads impregnated with plastic material; Fig. 9 is a sectional view of a piece of material made from a plurality of layers of metallic fabric impregnated with plastic material.

This invention is in part a division of my co-pending application, Serial No. 337,675, filed October 6, 1906, for a tire; and in part a division of my co-pending application, Serial No. 337,674, filed October 6, 1906, for metallic yarn and fabric.

I have discovered that fine metallic fiber cut or shredded from 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 and yarn may be made therefrom. 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, thereby making it possible to spin the fibers into yarn.

Referring to the drawings, Fig. 1 represents a mass of cut metallic fiber. This metallic wool may be made from any suitable metal as steel, brass, bronze, or other alloy. The material is preferably first carded to facilitate the operation of spinning, and if desired, the material may be annealed before carding for the purpose of putting it into such physical condition as will make it most adaptable for the subsequent manipulation. If yarn is made from unannealed metallic wool, the yarn may be annealed after spinning, or if desired, it may be hardened and tempered. If the wool is first annealed, and then spun, the yarn may be then hardened and tempered.

In accordance with this invention, the metallic yarn is impregnated with a suitable plastic, as for instance gum of any suitable character or rubber, and in Fig. 2, I have illustrated a metallic yarn A impregnated with rubber B. Celluloid or any artificial gum may be used instead of rubber.

The yarn may be impregnated with, and incorporated in, rubber by applying the rubber in the form of a solution, or by placing the yarn between the layers of raw rubber already prepared by milling with the proper proportions of flower sulfur, approximately ten per cent., and then placing the layers of yarn and rubber in a suitable vulcanizing press, and curing the material with the addition of pressure as well understood by those skilled in the art of rubber manufacture.

As shown, in Fig. 2 the rubber enters the interstices of the yarn. By modifying the vulcanizing process in the ordinary manner, a product consisting of hard rubber having yarn impregnated therein may be made. By varying the composition of the milled rubber, the product may vary from a soft flexible material to a hard gutta percha.

In Fig. 3, the yarn A is shown wound upon a suitable core C, and the whole impregnated with rubber or other suitable plastic B. In Fig. 4, the material is shown having a plurality of yarns A lying side by side impregnated with and incorporated in, rubber B, or other suitable plastic, and Fig. 5 is a cross section of Fig. 4. Substantially the same processes of manufacture are carried out when a plurality of yarns are used as when one yarn is used. In Fig. 6, the yarns A are shown crossed and the whole

impregnated with and incorporated in, rubber or other plastic B.

If desired, the yarns may be woven into a fabric as in Fig. 7, and the fabric impregnated with and incorporated in plastic B as shown in cross section in Fig. 8. Fig. 9 shows a plurality of layers of metallic fabric impregnated with and embedded in rubber or other plastic. Instead of weaving the yarns into a fabric they may be netted or knitted, or manipulated in any other manner to form a fabric.

It will be noted that in the various forms of plastic fabric shown in Figs. 4 to 9 inclusive the spun metallic yarns are arranged in regular order and embedded or incorporated in the plastic material. The plastic fabric thus formed may vary in thickness and pliability, according to the use for which it is intended. For instance, I may produce a fabric of soft or annealed yarn embedded in flexible rubber, or I may use tempered or hardened yarn incorporated in gutta percha or hard rubber, or I may make fabrics of any grade intermediate these extremes. I may also, for some purposes, use soft or annealed yarn or fabric in hardened plastic material or hardened yarn or fabric in soft or flexible plastic material. By the term "metallic fabric" I intend to designate any fabric made from metallic yarn or thread whether woven, knitted or otherwise produced; and by the term "plastic material" I intend to designate any material which is soft or plastic when the metallic yarn or fabric is incorporated therewith, notwithstanding it may subsequently become hard, as in the case of hard rubber or gutta percha.

Plastic compositions and fabrics embodying my invention are useful for many purposes. When the metallic yarn or fabric is combined with rubber or other soft material it is suitable for floor covering, stair treads, conveyer belts, packing for joints, shoe soles and heels, treads for pneumatic or solid tires, etc.

I claim and desire to obtain by Letters Patent the following:

1. As an improved article of manufacture, a compound plastic material, comprising a plastic substance having metallic yarn fabric incorporated therein.

2. As an improved article of manufacture, a compound plastic material, comprising a plastic substance having a metallic fabric made of spun metallic wool incorporated therein.

3. As an article of manufacture, a compound plastic material, comprising a plastic substance having a metallic fabric woven from metallic yarn incorporated therein.

4. As an improved article of manufacture, a compound plastic material, comprising rubber having a metallic fabric made of metallic yarn incorporated therein.

5. As an improved article of manufacture, a compound plastic material, comprising rubber having a metallic fabric made of spun metallic wool incorporated therein.

6. As an article of manufacture, a compound plastic material, comprising rubber, having a metallic fabric woven from metallic yarn incorporated therein.

7. The improved fabric, comprising a layer of metallic yarn fabric with outer layers of plastic material.

8. As an improved article of manufacture, a compound plastic material comprising a metallic yarn impregnated with plastic material.

9. A metallic yarn spun from metallic fibers, said yarn being impregnated and coated with plastic material.

10. An improved plastic fabric consisting in a plastic material having a plurality of spun metallic yarns incorporated therein in regular arrangement.

11. An improved plastic fabric consisting in a plastic material having a plurality of series of spun metallic yarns incorporated therein in regular arrangement the yarns in one series being arranged transversely of the yarns in another series.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses, October 17th, 1908.

WALTER HUNNEWELL UNDERWOOD.

Witnesses:
E. VAN ZANDT,
E. P. LA GAY.