Aug. 20, 1935. F. J. REUTER 2,011,593

PACKING FABRIC

Filed Sept. 26, 1928

Fig. 1

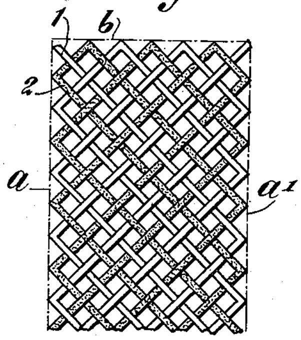


Fig. 2

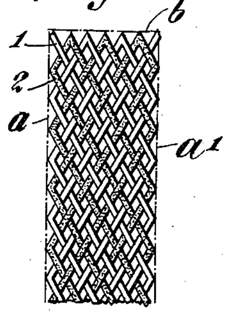


Fig. 3

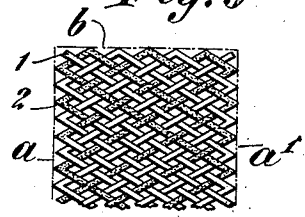


Fig. 4

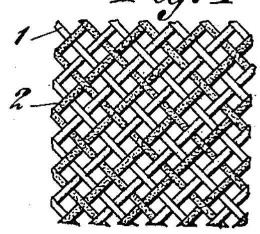


Fig. 6

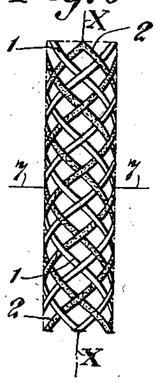


Fig. 5

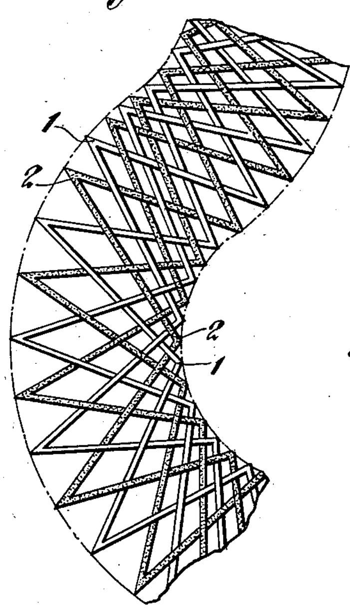


Fig. 8

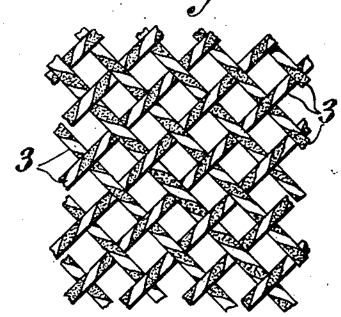


Fig. 7

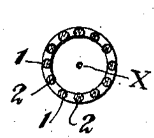
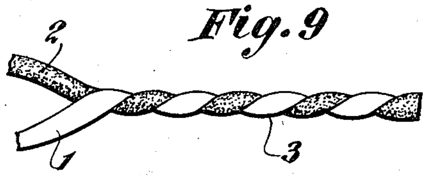


Fig. 9



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UNITED STATES PATENT OFFICE

2,011,593

PACKING FABRIC

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Application September 26, 1928, Serial No. 308,381

1 Claim. (Cl. 154—45.5)

My invention relates to packing materials for stuffing boxes and, more particularly, to packing fabrics.

A good packing material should possess as great a mobility of its constituent parts as it is possible to provide for it without destroying the necessary cohesion. Loose packing, while mobile, is lacking in cohesion. On the other hand, packing fabrics, as made today, whether in sheet form or ribbons, are closely woven and, therefore, are devoid of mobility although possessing the necessary cohesion.

In a copending application, Serial No. 204,450, which has been issued as Patent No. 1,847,262, dated March 1, 1932, I have disclosed a new packing fabric in which great mobility is combined with strong cohesion of the constituent parts. The fabric, as described in the aforesaid application, is a loosely woven mesh composed of strands of soft metal, strands of a refractory material, and strands of a yarn, such as flax, for instance. The fabric is impregnated with a suitable lubricant.

As I stated in my former application, I have obtained satisfactory results in some cases where the flax was omitted from the mesh. The present application is concerned with this modification of my invention.

Referring to the drawing, Figure 1 is a plan view of a fabric embodying my invention, in sheet form. Figures 2 and 3 are plan views of this fabric after it has been stretched, respectively, in the longitudinal and in the transversal directions. Figure 4 is a plan view of a fabric made in accordance with my invention but differing from the one shown in Figure 1 in that the strands are not continuous, Figure 5 is a plan view of the same fabric formed into a gasket of irregular shape. Figures 6 and 7 are, respectively, a top view and a cross section of a similar fabric in tubular form. Figure 8 is a plan view of another modification of my invention. Figure 9 is a detail showing one of the strands of the fabric illustrated in Figure 8, enlarged.

In Figures 1 to 7, the fabric is a mesh comprising strands 1, of a soft metal, such as lead, copper, tin, aluminum, or a soft alloy; and strands 2, of a mineral or vegetable fibre, which may be a refractory material, such as asbestos, for instance. The metal strands may be solid or composed of a plurality of filaments. The strands are spaced, as shown, and intermeshed at an angle to one another which, in Figure 1, is shown as a right angle, although I am not limiting myself to this particular angle. The strands are inclined to the border lines *a*, *a'*, *b*, of the sheet, at an angle corresponding to the mutual inclination of the strands to one another. When, as in Figure 1, the strands are intermeshed at a right angle, they form an angle of 45° with the border lines. Figures 2 and 3 clearly show how the inclination of the strands to the border lines changes with the change in the mutual angle of the strands to one another.

In the case of a tubular fabric, Figures 6 and 7, the strands form helices at each point of which the tangent makes an angle of 45° with the axis X—X. The angle of this tangent may be varied within wide limits, and 45° has been adopted in the drawing merely as an illustration.

The strands may be continuous, as in Figure 1, or discontinuous, as in Figure 4. In the case of a sheet or ribbon, with continuous strands, the strands are bent where they meet on the border lines, at an angle corresponding to the angle formed by the intermeshing strands, as explained above. In the case of a tubular fabric, no bending of this kind is needed.

The spacing of the strands must be sufficient to permit deformation of the fabric in order to secure the necessary mobility. No definite figures can be given to cover all cases, as the spacing depends on several variable factors, such as what materials are used for the strands, whether the metal strands are solid or composed of a plurality of filaments, or what lubricant the fabric is impregnated with. For instance, a metal strand composed of a plurality of filaments has intrinsically more mobility than a solid strand, so that spacing may be closer in the former case than in the latter. Likewise, the nature of the lubricant may have an effect on the spacing proportions. For instance, a thin lubricant, such as oil, is compatible with a somewhat closer spacing than a thick lubricant, such as a wax, or a gum.

Instead of intermeshing the strands of metal and the strands of fibrous material as separate elements, I may form compound strands 3, by twisting metal and fibrous strands around one another, as shown in Figure 9, or by making them into braids, and then weave the mesh in the same manner as before but with the composite strands, as illustrated in Figure 8.

After the mesh is woven, it is placed in a vacuum tank and impregnated with a lubricant. For the latter I may use an oil, a wax, or a gum; or any combination of them; or I may use any one of these lubricants, singly or in combination, with the addition of graphite.

As constructed, my fabric is easily deformable, whether in the shape of a sheet, a ribbon, or a tube. In the case of a sheet or ribbon, the fabric may be elongated, causing a corresponding contraction transversally, as is illustrated in Figure 2; or it may be expanded transversally, causing a corresponding longitudinal contraction, as is illustrated in Figure 3. In the case of a tube, axial extension or contraction is accompanied, respectively, by a contraction or expansion of the cross section. The ability to expand and to contract, characteristic of my fabric, endows it with a plasticity which is lacking in both, the packing fabrics as they are manufactured today, and the various forms of solid packing materials. As compared with loose packing, besides the advantage of my fabric in possessing cohesion which a loose packing has not, the mobility of the constituent parts in my fabric is of more uniform character. The mobility of the particles in a loose packing, as every one familiar with its uses is aware, is very uneven and irregular, and liable to cause binding. My fabric is not only free from the defects due to insufficient mobility, but it possesses great facility for automatically adjusting itself to changing conditions.

The selection of the metal to be used in the fabric is indicated by the duty to be performed. For light duty, lead, tin, aluminum, or light alloys are appropriate. Ordinarily, lead will serve the purpose. In cases where the packing is likely to be subject to the action of strong acids, it is better to use aluminum for the metal strands. For heavy duty, with high temperatures, or high pressures, or high speeds, or where greater tensile strength of the packing is required, copper should be used.

I have found that satisfactory results are secured for variations in the proportions of metal, fibrous material, and lubricant, within wide limits. The following example may be taken as illustrative. Under usual conditions and for ordinary duty, when the metal strands are of lead, excellent results are obtained with a proportion of 28 parts asbestos to 100 parts lead, by weight. This proportion, however, may be greatly varied, satisfactory results having been obtained with as low as 15 and as high as 50 parts asbestos to 100 parts metal, under various working conditions. In the case of copper, which is used in preference to lead when the temperatures involved are high, or, even at low temperatures, when greater tensile strength of the packing material is required, an excellent formula is 1 part asbestos to 3 parts copper, by weight. Here, again, the proportion may be varied within as wide a range as in the case of lead strands.

As to the selection and proportion of lubricant, this, also, depends on the duty to be performed. The proportion of lubricant may vary from 8% to 50% of the total weight of the fabric, the percentage increasing with the heaviness of the duty to be performed. For high duty, I prefer to make up the lubricant of one part oil, one part wax or gum, and two parts graphite, these proportions being, of course, approximate and flexible. For light duty, I prefer to make up the lubricant of one part oil and one to one and a half parts graphite, with only a trace of wax or gum, or even without any. It may be well to note that heavy oil should be preferably used in making up the lubricant when the temperatures involved are high, while, for low temperatures, light oil is more suitable.

My fabric is also adapted for use as a gasket, owing to its great pliability. Such a gasket is illustrated in Figure 5. It may be formed of a single layer of the fabric, or of several superimposed layers, or it may be of tubular construction, such as is shown in Figures 6 and 7, or in any of the many forms suitable for the purpose and well known in the art.

I claim:

A packing fabric comprising a mesh of spaced continuous strands inclined to the longitudinal direction thereof, said strands being composed of filaments of a soft metal and of a fibrous material twisted around one another.

FRANCIS JEAN REUTER.