June 12, 1923. 1,458,577

J. A. HEANY

ASBESTOS YARN

Filed Feb. 5, 1920

Fig. 1

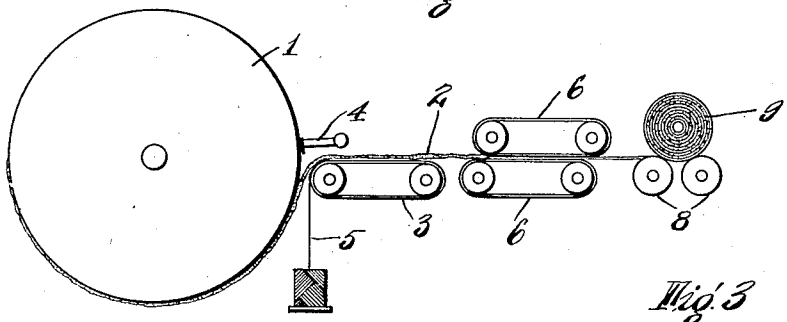


Fig. 2

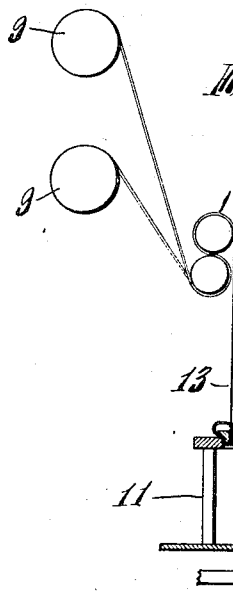


Fig. 3

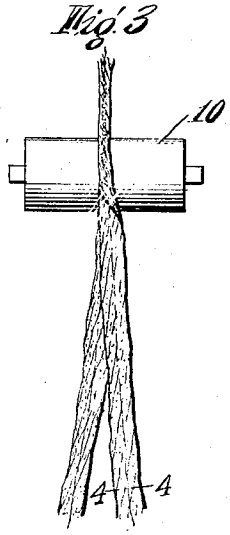


Fig. 6

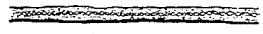
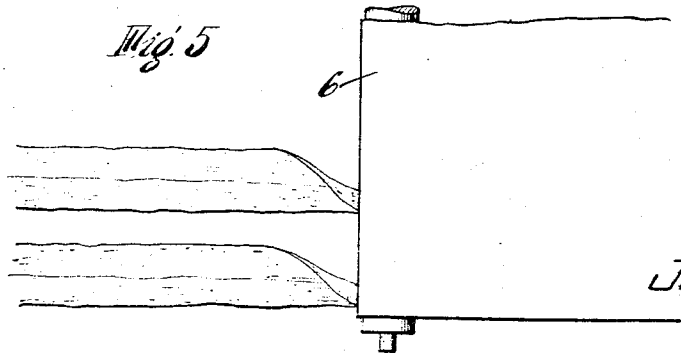


Fig. 4

Fig. 5



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Patented June 12, 1923. 1,458,577

UNITED STATES PATENT OFFICE.

JOHN ALLEN HEANY, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ROCKBESTOS PRODUCTS CORPORATION, A CORPORATION OF DELAWARE.

ASBESTOS YARN.

Application filed February 5, 1920. Serial No. 356,562.

To all whom it may concern:

Be it known that I, JOHN ALLEN HEANY, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented a new and Improved Asbestos Yarn, of which the following is a specification.

My invention relates to asbestos yarn and to the method of producing the same. It has for its general object the production of an asbestos yarn having high tensile strength; having a strong mechanical bond between its fibers; and capable of effective and lasting use in the most wearing situations.

In my application, Ser. No. 355,117 I have described the manufacture of asbestos yarn by a method which renders it feasible to use little, if any, cotton intermingled with the asbestos fibers and which makes it possible to use the cheaper grades of asbestos commonly known in the art as "mill fiber." The method referred to consists in mechanically cleaning the dirty "mill fiber" and simultaneously mixing therewith a small amount of cotton for the purpose of producing the required uniformity of mixture and at the same time causing the short asbestos fibers to become entangled with the cotton fibers and thereby held from escaping with the dust and other impurities; in carding the flocculent mass thus produced to form slivers of suitable width; rolling the slivers around reinforcing filaments of thread or metal: and finally, twisting the reinforced strands individually to form the finished yarn.

While the yarn made by this method is admirably adapted for many purposes, it is not rugged enough to withstand successfully the violent stresses and abrasions to which it would be subjected when used, for instance, as the constituent of an automobile brake lining.

In order, therefore, to produce an asbestos yarn having high tensile strength and having a very strong mechanical bond between the fibers, I have conceived and reduced to practice a modification of the method described in the application referred to, which modification I will now describe by reference to the accompanying drawings in which,

Fig. 1 is a diagrammatic view of an apparatus suitable for forming a soft reinforced asbestos strand in accordance with the method described in my above-mentioned application.

Fig. 2 is a diagrammatic view of a twisting mechanism adapted to twist two or more strands formed by the mechanism shown in Fig. 1 into a multiple core yarn.

Fig. 3 is a diagrammatic developed view showing a detail of the twisting operation.

Fig. 4 is a cross section on line 4—4 of Fig. 3.

Fig. 5 illustrates diagrammatically the operation of one of the steps of the process.

Fig. 6 is a diagram showing the twisted strands centrally disposed of the fibres which are interlocked thereby.

After the asbestos fibers have been cleaned and mixed with a small percentage of cotton and the mixture thoroughly carded, as described in my aforesaid application, the doffer ring, which is represented in Fig. 1 by the numeral 1, delivers the fibers in the form of ribbon-like slivers 2 which are stripped from the doffer by the oscillating comb 4 and deposited upon transfer belt 3. A filament 5 of thread or wire is fed along under the silver and passes together with the latter between the rub motion belts 6, which in a well-known manner roll and condense the sliver around the filament. The strand thus produced is formed by the winding rollers 8 into a roll or cop 9.

The rolls 9 are next taken to a twisting machine in which two or more of the strands are led around feed rollers 10 and then to a suitable twisting mechanism 11 which twists the strands together and winds the finished yarn 13 onto a spool 14.

The multiple core yarn made by this process has a comparatively smooth cylindrical periphery; so far as outward appearances indicate, it seems to be formed by the twisting of a single strand. A large part of the asbestos fibers are tightly clamped between the twisted wires or threads which are located axially of the yarn and therefore well protected from the disintegrating effects of heat, fluids, etc. These characteristics will be evident from a consideration of what takes place in the different steps of the process.

The action of the rub motion belts 6 in rolling the sliver around the filament 5 ef-

fects an irregular but more or less spiral arrangement of the asbestos fibers around the filament. This action is illustrated in Fig. 5, in which it will be seen that, as the sliver enters between the belts, it is first rolled from one of its edges, the fibers being curved spirally around the filament and retaining their spiral arrangement to some extent during the subsequent to-and-fro rolling of the strand as it passes through the belts.

Because of the softness of the untwisted strands, they assume a flat form when rolled into cops or rolls.

The flattened strands are fed from the rolls 9 in superposed relation over the feed rollers 10, Fig. 2. If the strands happen to be out of alinement, they are drawn into substantially exact superposition by the twisting action as they pass over the upper feed roll 10. This is shown diagrammatically in Fig. 3, which is a developed view designed to indicate the shifting together of the strands and the spiral folding over thereof just prior to the twisting proper. From a consideration of the view it will be evident that as the flat strands shift together in superposed relation they are first folded over spirally around the reinforcing filaments and then twisted together with said filaments, the latter twisting around each other and tightly clamping between them many of the asbestos fibers. As before stated and as indicated in Fig. 3, the asbestos fibers for the most part are arranged spirally or obliquely with relation to the reinforcing filaments, so that when two or more strands are twisted together the filaments grip between them substantially all of the long fibers and a large part of the short fibers; then as the twisting proceeds the strands are first folded spirally around the reinforcing filaments and then twisted about a common axis which is substantially coincident with the filaments, the latter approaching each other and compressing and clamping between them the asbestos fibers tighter and tighter as their turns per inch increase. The resulting yarn has a comparatively smooth exterior appearance, has great tensile strength, and provides a strong mechanical bond between the fibers, holding them together with such tenacity that the yarn can withstand the wearing and tearing effects of the most violent uses. The reinforcing threads or wires are located close together along the axis of the yarn where they are covered and well protected by their asbestos sheath. Since the fibers are for the most part held together by the reinforcing filaments, it is necessary to use little, if any, cotton as a binder for the asbestos fibers; consequently the sheath may be composed of substantially pure asbestos, if desired.

Various modifications of the above-described process may be made within the scope of my invention. For example, I may twist a bare metallic filament together with one or more untwisted strands, reinforced with a cotton or metallic filament, or I may twist two bare metallic filaments together with two untwisted strands each reinforced by a cotton or other fibrous filament; or two bare metallic or fibrous filaments with one or more untwisted strands in which there is no reinforcing filament. In the formation of all these various combinations the softness of the untwisted strand or strands permits the filaments to approach each other during the twisting operation and finally occupy a position substantially along the axis of the yarn, the softness of the untwisted strands permitting the filaments to assume a close juxtaposition in the finished yarn, wherein they securely hold between them many of the asbestos fibers, and wherein all of the asbestos fibers are tightly twisted around the filaments as an axis, thus resulting in the production of a unitary yarn having the regular and unbroken surface characteristics of a single-strand yarn, but being much superior to a single-strand yarn in tensile strength and in tenacity of bond between the fibers.

I claim:

1. The process of forming asbestos yarn, which consists in twisting together a plurality of untwisted asbestos strands having filamentary reinforcing cores.

2. The process of forming asbestos yarn which consists in applying asbestos fibers in covering relation to each of a plurality of filamentary tensile members, flattening the filament-reinforced strands thus produced, and superposing and twisting the flattened strands into yarn.

3. The process of producing asbestos yarn, which consists in rolling slivers of carded asbestos fibers around reinforcing filaments in such a way that the fibers are arranged spirally around the filaments, flattening the strands thus produced and superposing and twisting the flattened strands into yarn.

4. The method of making asbestos yarn from the low-grade asbestos commonly known in commerce as "mill fiber," which consists in mechanically cleaning the "mill fiber" while mixing therewith a small percentage of cotton, carding the mixture of asbestos and cotton thus produced to form slivers, rolling the slivers around reinforcing filaments and finally, twisting together the soft reinforced strands thus produced to form a multi-core yarn.

5. The process of manufacturing asbestos yarn which consists in mixing asbestos with a relatively small percentage of cotton, carding the same to produce slivers of uniformly-distributed asbestos and cotton fibers, rolling said slivers under pressure around rela-

tively strong filaments, and finally twisting together the strands thus produced.

6. The process of manufacturing asbestos yarn, which consists in mixing asbestos with a small percentage of cotton, carding the mixture thus obtained to form slivers of uniformly-distributed asbestos and cotton fibers, feeding the slivers between longitudinally-progressing and laterally-reciprocating surfaces to produce soft strands, and finally twisting the strands together with a plurality of reinforcing filaments.

JOHN ALLEN HEANY.