Dec. 28, 1943. H. R. FRY 2,337,986

PACKING

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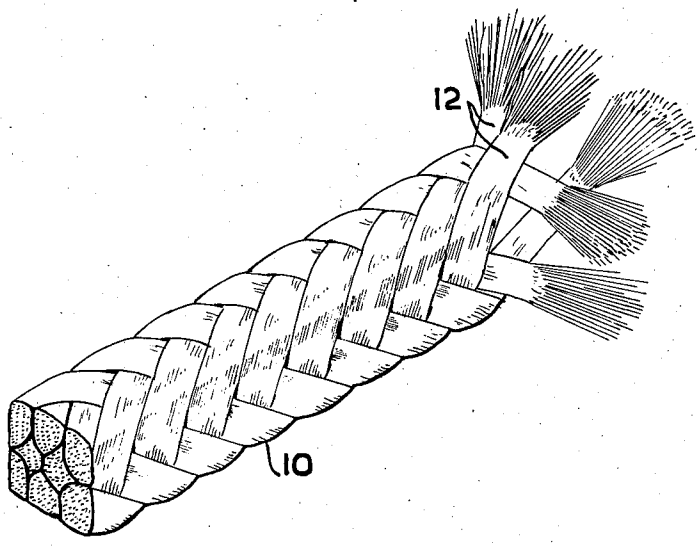


Fig. 1

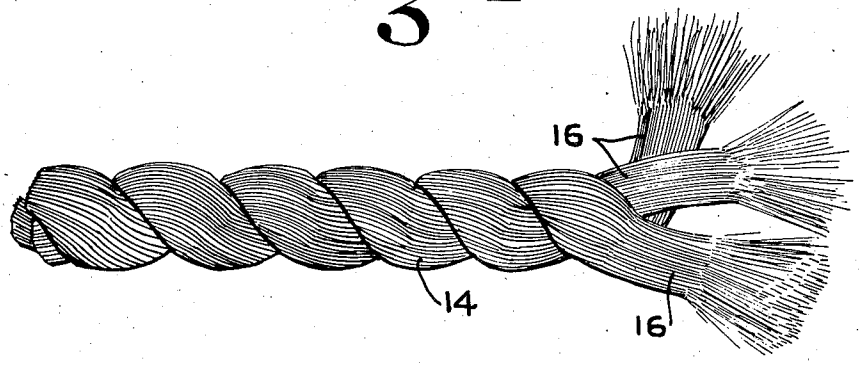


Fig. 2

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ATTY.

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PACKING

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1 Claim. (Cl. 87—8)

This invention relates to packing for general hydraulic service in pumps, elevator plungers, rams, accumulators, and equipment handling fresh and salt water, and brine. The invention, more specifically, relates to a packing comprising continuous artificial cellulosic filaments.

It has been customary heretofore to construct packing, particularly for pumps handling hot and cold water, from flax and cotton fibers. Flax fibers ranging in length from five to forty inches and short cotton fibers have been spun, drawn, and twisted to give a roving. Rovings of a suitable size have then been braided into a packing. This packing has been impregnated with a lubricant such as tallow before installation in the pump. In some cases, the roving has been impregnated with the lubricant before the braiding operation.

Packing constructed from rovings of flax or cotton fibers of comparatively short lengths has been objectionable in a number of cases. The many fiber ends protrude to some extent on the surface of the packing and provide resistance to the movement of the pump part over the surface of the packing. The comparatively short fiber rovings which made up the braided packing have been known to pull apart, thus requiring repacking of the pump. Also, packings from short fibers frequently have not held up well under high pressures. Flax deteriorates quickly in the presence of acid and basic solutions, even though these solutions be dilute.

It is, therefore, an object of the present invention to provide an improved packing for pumps, etc. It is another object of this invention to provide a packing which exhibits a minimum of resistance to the moving parts of the pump in contact therewith.

Other objects of this invention will appear hereinafter.

The objects of the present invention are accomplished, in general, by constructing packing from one or more ropes or bundles of continuous artificial filaments.

For convenience, this invention will be described in terms of a tow or rope of continuous regenerated cellulose filaments produced from viscose, although other artificial cellulosic materials may also be used, for example, continuous regenerated cellulose filaments produced by the cuprammonium cellulose process as well as continuous filaments of cellulose acetate, ethyl cellulose, partially saponified cellulose acetate, and the like.

The present invention will be more readily understood by reference to the following detailed description when taken in connection with the accompanying illustration, in which;

Figure 1 is a perspective view of a braided packing constructed of continuous artificial cellulosic filaments.

Figure 2 is a perspective view of a twisted packing constructed of similar continuous filaments.

Referring to Figure 1 of the drawing, reference numeral 10 designates a braided packing comprising a plurality of ropes or bundles 12 of continuous artificial cellulosic filaments.

In Figure 2, numeral 14 designates a twisted strand structure comprising a plurality of bundles 16 of continuous artificial cellulosic filaments.

In accordance with the preferred practice of the present invention, a plurality of ropes or bundles of substantially parallel, continuous artificial cellulosic filaments is braided together in the conventional packing braiding equipment and the resulting braided product impregnated with a lubricant such as tallow. The resulting product may have a square, round, or other cross-section depending upon the particular braiding process used. Alternatively, the braided product may be calendered or pressed to more accurately conform to the desired shape. The packing composed of the braided continuous filament cellulosic ropes is then ready for cutting to the desired lengths for incorporation in the packing glands of equipment requiring the use of such packing.

It has been found that bundles or ropes of continuous filaments spun by the well-known processes from viscose are suitable for use in accordance with the present invention. The bundle or rope as used herein consists of a large number of continuous filaments brought together in one bundle. The bundle of filaments may be twisted or not as desired. It has been found further that special yarns such as the high tenacity yarns described in U. S. Patent No. 2,133,714 and the permanently crimped yarns described in U. S. Patent No. 2,249,745 are also suitable. In some cases, bundles or ropes composed of crimped filaments are preferred because of their high resilience.

The following specific examples will more clearly set forth the present invention:

Example I

Eight ropes, each of which consists of 5300 continuous, 1½ denier, regenerated cellulose filaments, are braided together on a standard braiding machine. The braided product is impregnated with tallow and pressed to give it a square cross-section. This material is used in packing a pump with excellent results.

Example II

Eight ropes, each of which consists of 5300 continuous, 3-denier, regenerated cellulose filaments twisted together with 0.4 turn per inch, were lubricated by impregnating them first with molten tallow, then cooling the same and then dipping them into molten Japan wax. The eight lubricated ropes were then braided on a standard rope braiding machine, and the resulting product used in packing a reciprocating piston water pump. The packing material performed satisfactorily for a long period of time.

Example III

Eight ropes, each comprised of 10,000 fiber "D" filaments, are braided in a conventional rope braiding machine. The braided rope is impregnated with tallow to produce a packing. The resulting packing showed long life as a packing for pumps handling warm or cold water. Packing constructed with fiber "D" filaments is very resilient and is of particular utility when a packing of high resilience is in demand.

New, crimped, wool-like regenerated cellulose fibers, filaments, and yarns and processes for producing the same are described and claimed in U. S. Patent No. 2,249,745. The process, as defined in said patent, comprises generally the extrusion of viscose into a coagulating bath having a rapid coagulating action and a slow, or no, regenerating action with a velocity of extrusion at least four times the velocity of draw-off. The streams of viscose issuing from the spinneret into the coagulating bath under the aforementioned conditions spontaneously assume a finely crimped form which persists as a permanent structural characteristic in the filaments.

The resulting yarn is composed of substantially non-crenulated filaments having an inherent and substantially permanent crimp, the crimps in the several filaments of the yarn being out of phase with each other. The filaments exhibit substantially no orientation in the direction of the fiber axis.

For purposes of convenience and ready identification, this yarn will hereinafter be referred to as fiber "D" yarn.

Packing produced from a rope of continuous regenerated cellulose filaments may be impregnated with any of the known lubricants used in the pump packing art. These will include greases, tallow, and tallow combined with other materials such as high melting waxes. The lubricants may further contain graphite. The lubricant may be applied to the rope either before or after braiding.

The filaments comprising the rope may vary in denier from 1 to 30 and higher, if desired. The rope may contain any desired number of filaments depending upon the size of packing to be produced. A rope consisting of 1300 regenerated cellulose filaments of 20 denier per filament and having a twist of 0.57 turn per inch, gave excellent results when braided into a pump packing material. The rope may be twisted or not twisted before the braiding operation according to the degree of rigidity desired. Since the rayon rope is made up of continuous filaments, twisting is not required for strength.

The pump packing of the present invention has the advantage that the continuous filaments have a slick smooth surface thereby setting up less friction with the moving part of the pump and requiring less power to drive the said moving parts in contact with the packing. The smooth surface of the filaments used in this invention has the further advantage that they permit less leakage of the liquid being pumped. The rough irregular surface of previously used fibers permits channeling through the packing whereas the artificial cellulosic continuous filaments of the present invention eliminate such channeling to a large extent. The continuous filament packing may be used in place of flax or cotton in all installations and may additionally be used satisfactorily in pumps handling dilute acids and caustic solutions. The packing is satisfactory in all types of pumps including centrifugal or rotary types and reciprocating types, which operate at high pressures. It may further be used in valve stems, accumulators, elevator plungers, presses, rams, etc., and on equipment handling cold or warm water, and brine.

A further advantage of the use of continuous filament cellulosic ropes in the manufacture of packing material is the uniformity with which the packing can be made. All the filaments are made the same size and the rope is uniform. No thick or thin portions will be present which will produce irregularities in the finished packing. Protruding or enlarged portions on a packing will wear to give a large number of broken ends. These ends are abrasive and cause wear of the moving parts in contact therewith.

Since it is obvious that many changes and modifications can be made in the above-described details without departing from the nature and spirit of the invention, it is to be understood that the invention is not to be limited to the details described herein except as set forth in the appended claim.

I claim:

A packing comprising a braided structure consisting of a plurality of ropes of continuous, substantially non-crenulated regenerated cellulose filaments exhibiting substantially no orientation in the direction of the filament axis and having an inherent and substantially permanent crimp, the crimps in the several filaments being out of phase with each other.

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