July 30, 1946. J. J. FIECHTER 2,404,952

METHOD OF MAKING PACKING

Filed Feb. 9, 1945

Fig. 1.

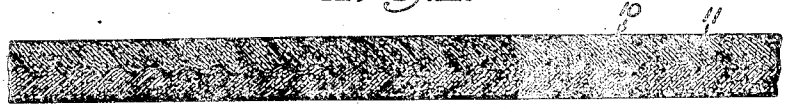


Fig. 2.

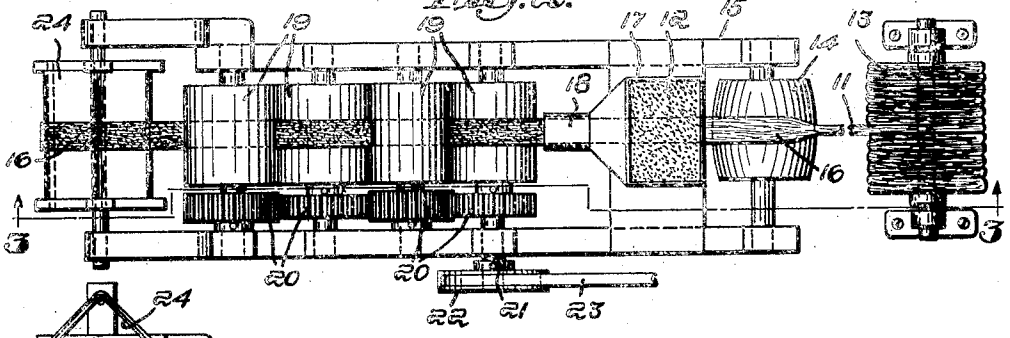


Fig. 3.

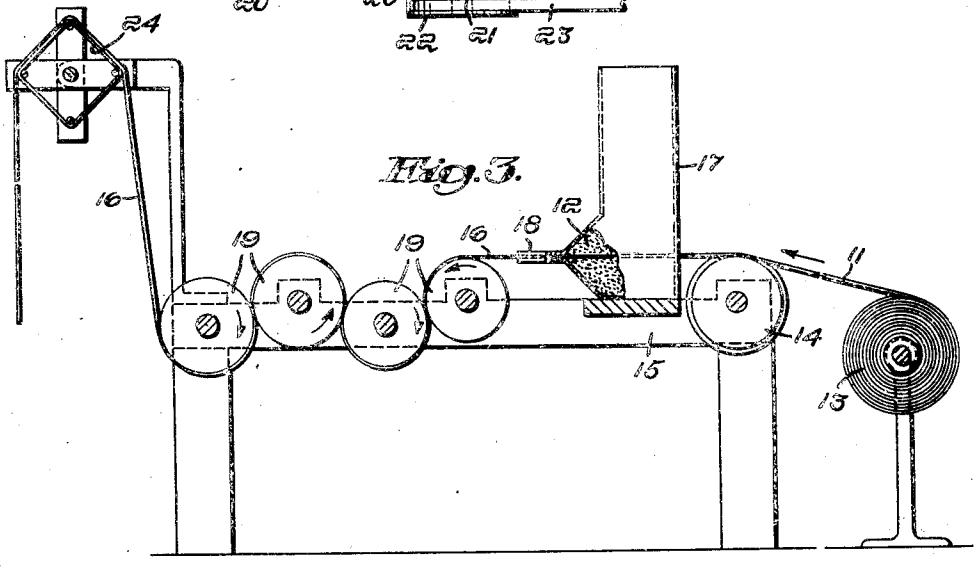
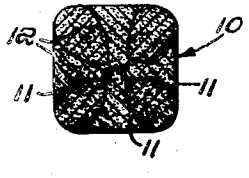


Fig. 4.



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METHOD OF MAKING PACKING

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2 Claims. (Cl. 154—33.1)

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This invention relates to self-lubricating fibrous packing of the type wherein a plurality of strands of fibrous material, such as cotton, rayon, or like fibres, or mixtures thereof, are impregnated with a lubricating compound and braided together to form a continuous length of packing material.

Heretofore in making this type of packing the usual practice has been to first braid the fibrous strands together and then impregnate the braided body with the lubricating compound, usually by soaking or boiling the braided mass in the presence of the lubricant to melt the lubricant and force it onto the braided strands.

Although the heat required to melt the lubricant caused some of the lighter or more volatile constituents of the lubricant to penetrate the braided strands, these lighter constituents had little or no lubricating value, nor any great resistance to liquids which might penetrate the surface coating of lubricant on the outside of the braided body. Moreover, the boiling or soaking action physically changed the structure of the braided body by causing it to swell, thus changing the tension of the braiding from that originally given it.

With these, and other disadvantages of the conventional pre-braided packing in mind, I have devised my present invention. According to it, I first impregnate each individual strand or filament composing the packing with the lubricating compound, and afterwards braid the impregnated strands and filaments together.

The impregnating step is carried out under conditions best calculated to insure complete and uniform saturation of the individual strands or filaments. Preferably, I first spread open each individual strand or filament while drawing it under tension through the lubricating compound. This insures that an adequate amount of the lubricating compound will be deposited upon all surfaces of the strand or filament. I then roll or otherwise mechanically force the lubricating compound into the opened strand or filament under sufficient pressure to insure through-and-through impregnation thereof. The impregnated strands or filaments are afterwards wound on suitable reels and after sufficient time has elapsed for the lubricating compound to be thoroughly absorbed in the fibres thereof, the thoroughly saturated strands or filaments are passed to a conventional braider where they are braided into a braided body of round, square, oval or rectangular cross-section.

As a result of my treatment, when the pre-impregnated strands are braided into a braided body, the lubricating compound is as thoroughly distributed throughout the interior of the body as on its exterior. This is in sharp contrast to the pre-braided packings of the prior art where the body is first braided and then impregnated with the lubricating compound and hence substantially all of the lubricating compound is applied to the outside only of the pre-braided body, and such of the lighter constituents as may have penetrated somewhat into the pre-braided body had little or no lubricating value whatever.

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Other advantages of my pre-impregnated braided packing over the conventional pre-braided packing include the following:

When my pre-impregnated braided packing is applied in a stuffing box or the like and the gland nuts are tightened to take up on the packing, the virgin lubricant at the inside of the braided body is forced to the outside, thus re-lubricating the outside surface of the braided body with new lubricant. This is because the internal structure of my pre-impregnated braiding can act as a natural reservoir for the unused lubricant.

Another advantage is that when my pre-impregnated packing is used on installations which are exposed to the action of liquids, it offers as much resistance internally as externally to liquid penetration thereof, as well as having equally as good lubricating values, whereas with conventional pre-braided packing if the liquid penetrated the outside coating of lubricant there is little or nothing worthwhile in the way of internal lubricant to resist further penetration.

A further advantage of my pre-impregnated packing is that by first completely and uniformly impregnating the individual strands and afterwards braiding them into a braided body, the structure of my packing always remains the same and whatever tension was given it during the braiding operation is not changed. With pre-braided packing, the step of impregnating it by boiling or soaking the braided structure in the lubricating compound caused it to swell and the tension of its braiding to change.

Other advantages of my pre-impregnated packing are that it has a greater tensile strength than packing which has first been braided and afterwards impregnated; and because of its capacity for re-lubricating itself when the gland nuts are tightened, it more effectively lubricates the shaft or rod to which it has been applied.

Because it is pre-treated before it is braided it will not harden or stiffen in use, nor wear itself out due to excessive swelling, because the pre-treating prevents undue swelling.

In the accompanying drawing wherein I have shown a preferred embodiment of my packing and preferred method and apparatus for producing the same,

Fig. 1 is a side elevation of a length of pre-impregnated packing in accordance with my invention.

Fig. 2 is a plan view of a machine for practicing those steps of my method which comprise first spreading or opening up an individual strand while it is being drawn under tension through the lubricating compound, and thereafter mechanically rolling the lubricant under pressure into and through the opened-up strand.

Fig. 3 is a side elevation of Fig. 2, and

Fig. 4 is an enlarged cross-section through the packing of Fig. 1.

My pre-impregnated packing is indicated generally at 10 in Figs. 1 and 4. It comprises a plurality of strands 11 of fibrous material which are first impregnated and afterwards braided together to form a packing element.

The strands 11 may be any of the usual strands customarily employed for packing purposes, as cotton, rayon, flax, asbestos or the like, or combinations thereof. The lubricant 12 may likewise be any of the usual lubricants or lubricant compounds customarily employed for packing purposes, as tallow, graphite or the like.

In producing my packing, I prefer to proceed as follows:

From a spool 13, I draw a strand 11 under tension over a spreading roller 14 suitably journaled adjacent one end of a frame 15. Roller 14 is crowned, as shown, to cause the strand to be spread or opened laterally as at 16 as the strand is drawn thereover (see Fig. 2).

From the spreading roller 14, the strand is drawn through a trough 17 containing the lubricant 12. Trough 17 is provided with a restricted outlet 18 which prevents surplus lubricant from adhering to the strand.

The feed of the strand is accomplished by a succession of rolls 19, which are so arranged and driven as to press or squeeze the lubricant into and through the strand as the strand passes from one roll to the next.

Rolls 19 are journaled in frame 15 and are graduated in diameter, the roll nearest the trough being smallest in diameter, and the rolls beyond said roll being of progressively increasing diameter.

All rolls are rotated continuously in the directions indicated by the arrows in Fig. 3, as by means of the intermeshing gear train 20 driven from the shaft 21 of one of said rolls, as by pulley 22 and belt 23 to any suitable power source (not shown).

From the final roll of the series of squeeze

or press rolls, the opened and thoroughly-impregnated strand passes to a creel or creels 24 supported on frame 15, and thence to any suitable collection receptacle (not shown), where, after a suitable interval of time, it is braided with similarly impregnated strands in any conventional braider (not shown) and under any desired tension to form the product disclosed in Figs. 1 and 4.

From the foregoing it will be evident that as a result of first being opened up by the spreader roller 14 to receive the lubricant 12 and then having the lubricant worked into it by means of the squeeze rolls 19, the strand is completely and uniformly impregnated with the lubricant. The impregnation is through-and-through so that when the strands are braided together as a packing element, the lubricant is uniformly distributed throughout the entire mass of packing, both inside and outside.

After it leaves the braider, the packing may be cut into strips of any suitable length and wrapped in any suitable covering for convenience of handling.

If desired, I may apply a superficial coating of graphite or the like to the braided packing before packaging it.

Although I have disclosed a preferred embodiment of my packing and a preferred method of producing it, I recognize that many minor changes may be made in both article and method. All such are to be regarded as within the spirit and scope of my invention, if within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In the method of making a lubricant-impregnated braided packing which is characterized in that the several strands of fibrous material composing the packing are individually impregnated with the lubricant prior to being braided together, the steps which comprise first spreading each strand laterally and drawing it under tension through the lubricant, and thereafter and prior to braiding the strands together mechanically forcing the lubricant into and through the fibres of each opened strand.

2. In the method of making a lubricant-impregnated braided packing which is characterized in that the several strands of fibrous material composing the packing are individually impregnated with the lubricant prior to being braided together, the steps which comprise first spreading each strand laterally, drawing each opened strand through the lubricant, and mechanically forcing the lubricant into and through the fibres of each opened strand as an incident to the drawing step.

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