Oct. 27, 1931. N. SKILLMAN 1,829,574

SELF LUBRICATING FABRIC BUSHING AND METHOD OF FORMING THE SAME

Filed April 26, 1926

Fig. 1.

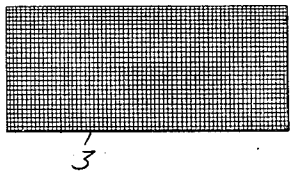


Fig. 2.

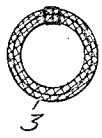


Fig. 3.

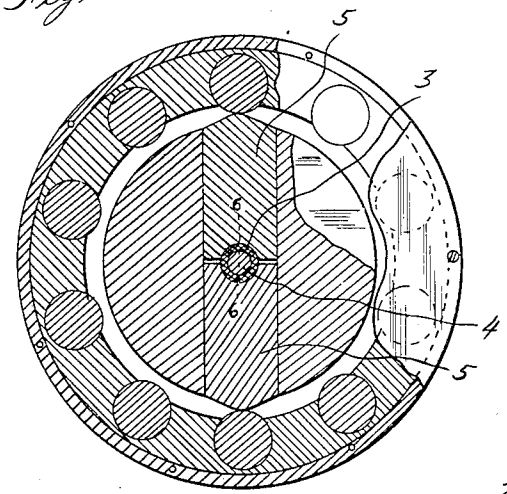


Fig. 4

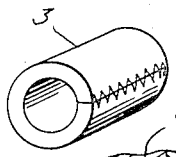
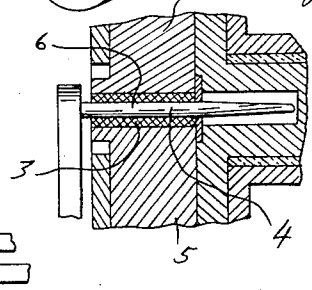


Fig. 6.



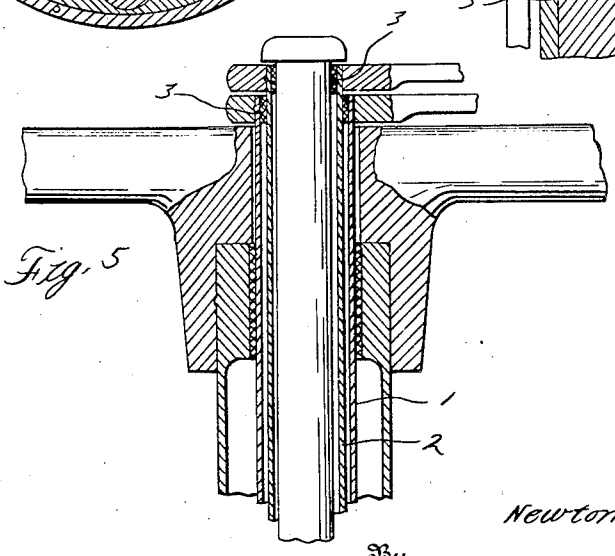


Fig. 5

Inventor
Newton Skillman

By Whittemore, Hubbard & Whittemore & Belknap.

Attorneys

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UNITED STATES PATENT OFFICE

NEWTON SKILLMAN, OF HIGHLAND PARK, MICHIGAN, ASSIGNOR TO O. & S. BEARING CO., OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

SELF-LUBRICATING FABRIC BUSHING AND METHOD OF FORMING THE SAME

Application filed April 26, 1926. Serial No. 104,736.

The invention relates to bushings and has for its main object the manufacture of a self-lubricating fabric bushing. Another object is to manufacture a lubricant impregnated bushing of fibrous material formed to retain its size. A further object resides in the novel method of making the bushing.

With these as well as other objects in view the invention resides in the novel features as more fully hereinafter set forth.

In the drawings:

Figure 1 is a plan view of a fabric web cut to predetermined length, from which the bushing is formed;

Figures 2 and 3 illustrate different steps in my method;

Figure 4 is a perspective view of the completed bushing;

Figure 5 is a section through a steering gear employing the bushing;

Figure 6 is a cross section on the line 6—6 of Figure 3.

The bushing embodying my invention is designed for use as a spacer between two relatively movable telescoping tubes, as for example between the quadrant control tubes 1 and 2 of a steering gear, which do not have enough stock to allow for reaming and then pressing into place a bearing unit comprising relatively movable inner and outer sections. The bushing is formed of woven fibrous material and as shown in Figure 1 the fabric web 3 is first cut to predetermined length. This web is then doubled and its ends stitched together by means of a butt-end sewing machine, to form an annular web, as shown in Figure 2. The annular fabric web is then impregnated with lubricant after which it is compressed by both expanding and contracting pressure as shown in Figure 3. This compressing is effected by placing the annular web upon the tapered arbor 4 which is located in a small rotating punch press having the reciprocable press jaws 5, which are bodily rotated about the arbor and engage the outer surface of the bushing. While these press jaws are compressing the annular web, the latter is being forced inwardly upon the tapered arbor so that the fibres of the annular web are being forced into very close, firm contact with each other while the internal and external diameters of the annular web are being respectively increased and decreased. The tapered arbor has the portion 6, which has an external diameter equal to the final internal diameter of the annular web while the press jaws 5 together have an internal diameter preferably slightly greater than the internal diameter of the telescoping tube within which the bushing is to be inserted so that they decrease the bushing to an external diameter slightly greater than the internal diameter of the tube. The punch press is operated until the bushing has been formed to its predetermined internal and external dimensions after which the bushing is removed from the arbor. This bushing, having had its fibres stretched and also highly compressed into intimate contact with each other, will retain its size and may be forced between the two telescoping tubes 1 and 2 where it functions efficiently as a spacer to prevent rattling. At the same time the bushing being lubricant impregnated lubricates these tubes so that they may more freely oscillate relative to each other.

What I claim as my invention is:

1. In a steering gear, the combination with concentric spaced control tubes, of a bushing insertable between said tubes and firmly engaging the same, said bushing comprising a cylindrical body impregnated with lubricant and formed of fibrous material and having its inner surface expanded to a diameter equal to that of the inner tube and its outer surface compressed to a diameter slightly greater than that of the inner surface of the outer tube, whereby the fibers of the annular body are forced into a close and firm contact with each other.

2. The method of forming a self-lubricating fabric bushing comprising stitching the ends of a fabric web to each other, impregnating the web with lubricant and simultaneously compressing and forming the fabric to size and shape whereby it will be self-sustaining.

3. The method of forming a self-lubricating fabric bushing, comprising stitching the ends of a fabric web to each other to form an annulus, impregnating the annular web with lubricant and simultaneously expanding and contracting the lubricant impregnated annular web to size.

4. The method of forming a self-lubricating fabric bushing which comprises stitching the ends of a fabric web to each other to form an annular web, impregnating the annular web with lubricant and expanding the annular lubricant impregnated web and simultaneously subjecting the same to swaging action for contracting the same whereby the annular lubricant impregnated web will retain its size.

5. The method of forming a self-lubricating fabric bushing comprising forming the fabric into an annulus, impregnating the annular web with lubricant and simultaneously expanding and contracting the lubricant impregnated annular web to size.

6. A unitary preformed bushing unit for spacing and lubricating steering gear tubes and the like, consisting solely of an annular body of woven fibrous material impregnated only with a lubricant, said material being highly compressed to form an annular wall adapted to inherently retain its size and shape prior to use.

7. An integral bushing unit for spacing and lubricating steering gear tubes and the like, consisting of an annular body of woven fibrous material impregnated only with a lubricant and preformed to inherently retain its shape and size solely because of said performing action, whereby it may be inserted as a complete bushing unit between the two members to be spaced and lubricated.

8. The combination with concentric spaced members such as steering gear tubes, of an annular bushing insertable as a preformed unit between said members, said bushing being formed solely of a lubricant impregnated woven fibrous material radially compressed into shape before assembly between said members, the outer diameter of said preformed unit being greater than the inner diameter of the outer spaced member.

9. The method of forming self-lubricating fabric bushings, which comprises initially forming a short strip of woven fabric into an annular lubricant impregnated web, temporarily supporting the web on a forming arbor and subjecting the same to an exterior swaging action until compressed to size, whereby the annular lubricant impregnated web will inherently retain its shape and size before use.

10. The method of forming a self-lubricating fabric bushing which comprises stitching a fabric web to form an annular web, impregnating the annular web with lubricant and subjecting the same to a radial swaging action for constructing the same whereby the annular lubricant impregnated web will inherently retain its shape and size before use.

In testimony whereof I affix my signature.

NEWTON SKILLMAN.