March 20, 1951 F. FODERARO 2,545,919

METHOD OF LOADING COPS

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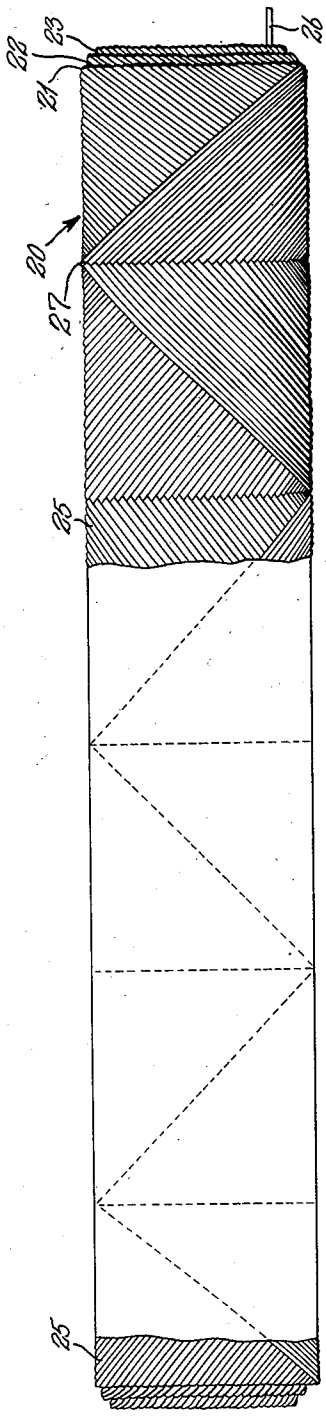

Fig. 1.

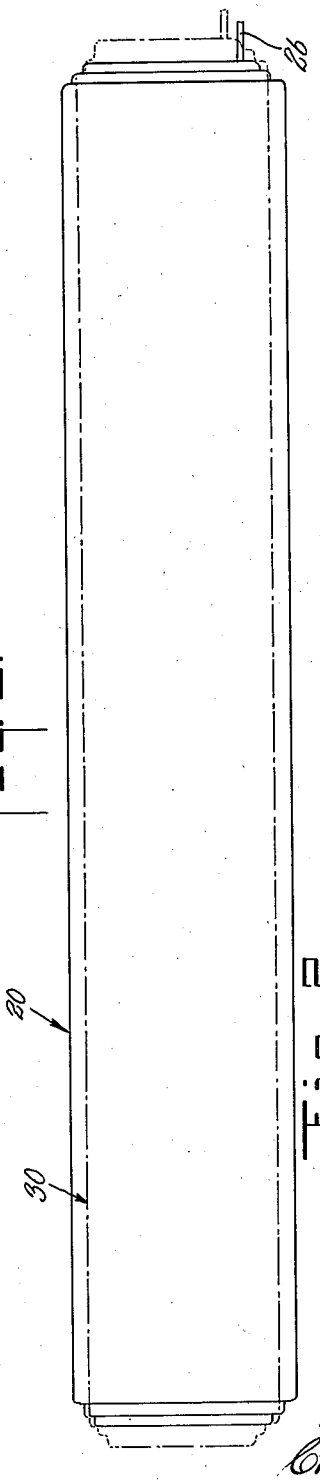

Fig. 2.

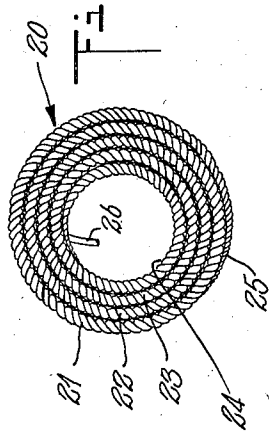

Fig. 3.

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METHOD OF LOADING COPS

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This invention relates to a universally wound cop such as is used in the art of weaving and a method of adjusting the same in a shuttle, and more particularly to a coreless cop used in weaving textile fabrics woven from twisted paper threads, as for example seat covering materials and summer rugs.

Coreless cops, that is cops having an air space or air "core" have heretofore been wound in progressively overlapping layers extending for but a relatively small portion of the length of the cop. When so wound a cop is easily broken if subjected to longitudinal tension or lateral strain and when so broken is relatively useless. Furthermore, a cop so wound is of fixed length and diameter and can only be inserted in a shuttle for effective use if said cop dimensions correspond substantially to the dimensions of the shuttle chamber.

One object of this invention is a coreless or air core cop which will not break when subjected to either longitudinal tension or to lateral strain.

Another object is a coreless cop which can be adjusted either longitudinally or cross-sectionally without breaking the cop.

Another object is a method of adjusting a cop to the chamber of a shuttle.

Other objects will appear from the detailed description which follows.

In the drawings comprising but a single sheet of three figures, numbered Figs. 1 to 3 inclusive, one embodiment of the invention is illustrated.

Fig. 1 is a side view of a coreless cop showing the manner in which the thread is wound;

Fig. 2 is a side view showing the cop in full lines in normal position and in dot-and-dash lines to indicate the cop when adjusted; and

Fig. 3 is an end view of the cop shown in Fig. 1.

Like reference characters designate corresponding parts throughout the several figures of the drawings.

The cop **20** is wound of a twisted thread of the type desired. For weaving seat covering materials and summer rugs, the thread **25** may be made by twisting paper ribbon into a thread in any known manner.

The thread **25** is arranged in layers **21, 22, 23,** and **24** wound with a winding machine which is capable of producing a universal type winding such as is shown generally in Fig. 1 wherein the turns of which each layer is made up, are spirally wound, crisscrossed or interlaced throughout said layer.

As best shown in Fig. 1 each turn of thread of a particular layer spirals around the length of the cop and spirals back again to the starting

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point, the return spiral of thread crisscrossing the initial spiral of thread at a plurality of points along the layer.

Since the cop has an open or air core and is otherwise coreless, the inner end **26** of the innermost layer **24** may constitute the feed end of the cop **20**, and the end **27** may constitute the outer end of the cop, although if desired the outer end **27** may be used as the feed end.

Since the cop does not contain a rigid core, the spiralled, crisscrossed or interlaced turns of thread allow the various layers to be extended in unison, as by pulling the opposite ends of the cop in opposite directions, without breaking the cop. In Fig. 2 the cop **20** when so extended is indicated in broken lines as cop **30**. The cop **30** may be returned to its original length by compressing the cop ends. The full lines in Fig. 2 substantially represent the normal external dimensions of cop **20**, and the dot-and-dash lines the changed external dimensions of said cop when its opposite ends are drawn in opposite directions. Thus by extending and compressing the cop, its cross-sectional area and length may be varied as desired without breaking the cop.

When the cross-sectional area and length are thus varied, the size of the cop may be adjusted to fit shuttle chambers of various sizes. Shuttle chambers tend to vary in width and cross-sectional area, and the cops themselves tend to vary in outside diameter, hence when the overall diameter of the cop, indicated by the full lines in Fig. 2, is larger than the width of the shuttle chamber, the opposite ends of the cop may be pulled in opposite directions to reduce the diameter of the cop substantially as indicated by the dot and dash lines in Fig. 2 until the outside diameter or overall cross-section of the cop has been sufficiently reduced so that the cop is small enough crosswise to pass between the inner faces of the side walls of the shuttle chamber. When the cop has been thus inserted in the shuttle chamber, the opposite ends of the cop may be compressed or pushed towards each other to expand the cop cross-sectionally thereby automatically adjusting the cop to fit snugly between the side walls of the chamber of the shuttle. This method of varying the cross-sectional area and length of the cop effectively compensates for variations in the outside diameters of the cops and variations in size of the cross-sectional areas of the shuttle chambers. Thus each cop may be individually and variously adjusted to fit the chamber of the particular shuttle with which it is to be associated without breaking the cop or

snarling the thread, and without requiring the removal of one or more outside layers of thread to adapt the outside diameter of the cop to the width of the shuttle chamber, thereby eliminating the discarding and wastage of layers of thread formerly necessarily removed from a cop in fitting it to a shuttle chamber.

Since the cop is coreless, resembling generally the form of a solenoid, it may be laterally flexed, and because the turns of each layer are spirally wound, such lateral flexing will not break the cop.

Although the body of the cop is hollow the layer by layer spiralled construction of the turns of thread which constitute the cop body impart sufficient rigidity to the cop body to make the cop self-supporting without resort to auxiliary stiffening means, the use whereof would impair the adjustability of the cop.

What is claimed is:

1. The method of loading a cop, having a winding wound universally and in tubular form to form a coaxially disposed hollow core defining an appreciable void, in the chamber of a shuttle, which consists in elongating the cop lengthwise to reduce its overall cross-section until the cop is small enough to pass between the side walls of the chamber of the shuttle, inserting said cop in the chamber of the shuttle, and then compressing the opposite ends of the cop to expand the cop cross-sectionally thereby automatically adjusting the cop to fit between the side walls of the chamber of the shuttle.

2. The method of loading a universally wound tubular cop, having a coaxially disposed hollow core defining an appreciable void, in the chamber of a shuttle, which consists in elongating the cop lengthwise to reduce its overall cross-section until the cop is narrow enough to pass between the side walls of the chamber of the shuttle, inserting said cop while thus elongated in the chamber of the shuttle, pushing the opposite ends of the cop towards each other to expand the cop cross-sectionally thereby automatically adjusting the cop to fit between the side walls of the chamber of the shuttle, and feeding the cop from the free end of the innermost layer of the winding through the hollow core thereof.

3. The method of loading a cop, having a self-supporting winding including an innermost layer consisting of a series of convolutions wound universally to define a self-supporting flexible tubular shell, the interior of said tubular shell being hollow and defining an air-core of appreciable cross-section, the free end of said innermost layer constituting the feed end of the cop, and a plurality of other layers each consisting of a series of convolutions universally coaxially successively wound upon and around said innermost layer and one above another to form in conjunction a flexible self-supported cop having a winding structure which can be stretched and compressed lengthwise to decrease and increase the overall cross-section of the cop, in the chamber of a shuttle; which consists in elongating the winding structure lengthwise until the overall cross-section of the cop is sufficiently reduced to enable the elongated cop to pass readily between the side walls of the chamber of the shuttle, inserting said cop when thus elongated in the chamber of the shuttle, pushing the opposite ends of the winding structure towards each other to expand the cop cross-sectionally until it is confined by and between the side walls of the chamber of the shuttle, and feeding the cop from the free end of the innermost layer of the winding through the core of the cop.

4. The method of loading a universally wound extensible self-supported open-cored cop in a shuttle which consists in elongating the winding of the cop lengthwise until the cop is narrow enough to pass between the side walls of the chamber of the shuttle, inserting the cop when thus elongated in the shuttle-chamber, pushing the opposite ends of the elongated winding towards each other to expand the cop crosswise until its further crosswise expansion is arrested by engagement with the side walls of the shuttle thereby automatically securing the cop in the shuttle-chamber, and feeding the cop from the free end of the innermost layer of the winding through the open core thereof.

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