United States Patent

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[73] Assignee **Messrs Jos Zimmermann**
a partnership
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[33] **Germany**
[31] **P 17 60 652**

[54] **SLEEVE FOR TREATMENT OF TEXTILE THREADS AND YARNS**
5 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **242/118.11**
[51] **Int. Cl.** **B65h 75/20,**
B65h 75/24
[50] **Field of Search** 242/118.11,
118.1, 118.2, 118, 77.2; 68/198, 189

[56] **References Cited**
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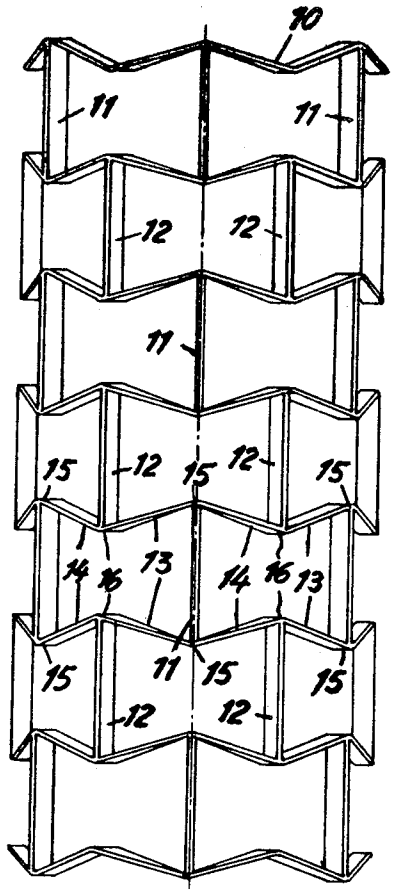
ABSTRACT: A textile treatment sleeve has a shell, which may be cylindrical or conical. The shell has peripherally extending rings which are spaced-apart and which are axially yielding. The rings are connected by spaced-apart webs which are rigid and extend longitudinally. Axially consecutive webs are laterally offset relatively to one another.



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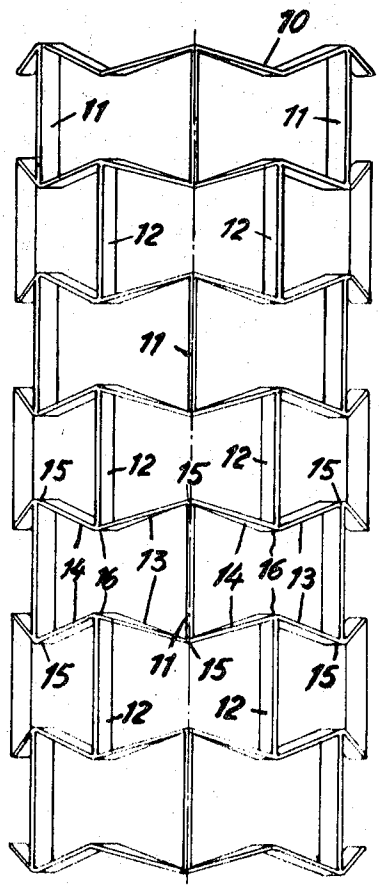

Fig. 1

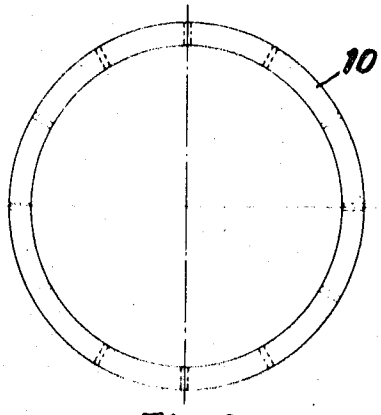

Fig. 2

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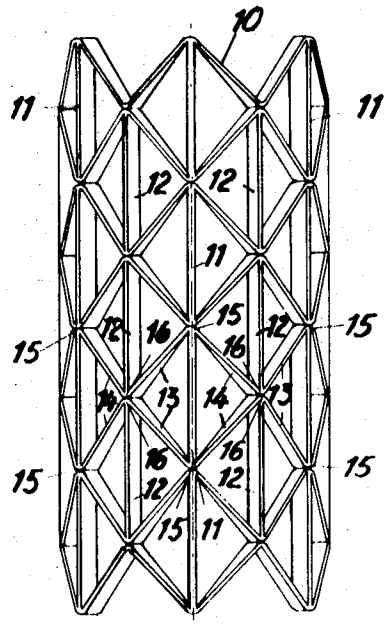

Fig. 3

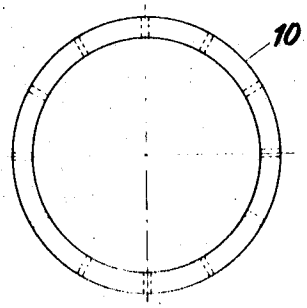

Fig. 4

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SLEEVE FOR TREATMENT OF TEXTILE THREADS AND YARNS

BACKGROUND OF THE INVENTION

The invention relates to a sleeve of thermoplastic material with a cylindrical or conical shell, for the heat and/or wet treatment of threads and yarns. For such treatment, threads and yarns are often wound on textile sleeves and subjected to the heat and/or wet treatment in this state. The heat treatment may be a shrinking treatment and the wet treatment may be dyeing of the threads and yarns.

It is known to provide, for shrinking of threads and yarns, a sleeve of thermoplastic synthetic material, known as a shrinking sleeve, which can be compressed, at the required shrinking temperatures, in radial direction under the action of the material to be shrinked and which remains in the compressed state after shrinking due to plastic deformation.

In the known shrinking sleeve the shell of the sleeve is formed with longitudinal slots uniformly distributed around its circumference, these slots subdividing the shell of the sleeve into a number of shell elements. Further, in this shrinking sleeve, the shell elements are interconnected with the aid of connecting members which form hinge points which, due to the shrinkage of the material by heat, permit the shell elements to move with reference to one another and in the direction of the axis of the sleeve.

It is also known to provide a sleeve of thermoplastic synthetic material for the purpose of dyeing threads and yarns, a so-called dyeing sleeve which, for the purpose of reducing its volume and the volume of the threads and yarns wound on it, can be compressed in the axial direction and which, when dyeing under the application of heat, remains substantially in the axially compressed state after completion of dyeing.

The known dyeing sleeve comprises a sleeve shell composed of rigid coaxial rings disposed at uniform axial distances apart and of webs interconnecting the rings and being elastically and/or plastically deflectable in axial direction. The webs interconnecting the rings have at least one portion inclined with reference to the longitudinal direction of the sleeve shell and are uniformly distributed around the sleeve shell. Further, preferably the webs are V-shaped and the limbs of the V point in the same direction. Therein, moreover, the webs disposed between two rings are provided at their apex zones with an inner stabilizing ring.

However, for many applications of sleeves for the heat and/or wet treatment of threads and yarns it is desirable that, when these sleeves are axially compressed, their diameter should simultaneously be reduced, and when they are compressed in radial direction, their axial extent should be reduced.

One of these applications is the treatment of texturated yarns, for example, curled yarns sold under the trade name "Helanca." For treatment, these yarns are wound in more or less stretched condition on the sleeves. When the textile sleeves with the wound yarn are subsequently axially compressed, the yarn tends to expand radially towards the outside as well as radially towards the inside. However, if a sufficient reduction of the diameter of the sleeve does not take place simultaneously with the axial compression, there results in the wound yarn greater compression of the inner layers of the yarn than of the intermediate and outer layers. This differential compression of the yarn results in different results of the treatment within the wound yarn, such as uneven dyeing and changes in the curl, and this is very undesirable.

The invention has the object of providing a textile sleeve of thermoplastic material having a cylindrical or conical shell, for heat and/or wet treatment of threads and yarns, wherein the sleeve undergoes with axial compression, simultaneously a positive reduction in diameter, and with radial compression simultaneously a positive reduction of its axial dimension.

SUMMARY OF THE INVENTION

This object is realized by a sleeve of the kind hereinbefore mentioned wherein the shell of the sleeve comprises peripherally extending, spaced-apart rings elastically and plastically yielding in axial direction, and spaced-apart rigid longitudinal webs connecting the rings, the axially consecutive longitudinal members being offset relative to each other.

In view of this configuration of the sleeve, the rings yield both under axial and under radial compression of the sleeve, and that mainly at the points at which the rigid longitudinal webs are connected to the rings. This results in a reduction of the distance between axially consecutive longitudinal webs on the one hand, and in a reduction of the distance between peripherally adjacent longitudinal webs on the other hand. Thus, when the sleeve is compressed in the axial direction, its diameter is necessarily reduced at the same time, and, vice versa, when it is radially compressed, its axial length is necessarily reduced at the same time.

According to the material used for the sleeve, the application of suitable pressures and temperatures will result in an elastic and/or plastic deformation of its yielding rings. If, as in the preferred embodiment, the sleeve is made of a thermoplastic material, such as polypropylene for example, the yielding rings will be elastically deformable at room temperature, whilst at higher temperature they will be both elastically and plastically deformable.

Furthermore, according to the invention, the rings and the longitudinal webs are equidistantly spaced-apart in the sleeve, and axially consecutive longitudinal webs are offset relative to each other by half their transverse spacing. This construction results in a uniform distribution of the rings and longitudinal webs over the shell of the sleeve and in a uniform deformation of the sleeve under axial or radial compression.

According to a further feature of the invention, the rings may have a corrugated configuration with kinking and bending points serving to promote their yieldingness, the longitudinal webs being connected to these kinking and bending points. This construction improves the yielding of the rings by permitting them to kink and bend at said points.

In a preferred embodiment of the sleeve of the invention, the rings are of zigzag configuration, and the section of each ring located between two longitudinal webs has two legs forming an angle, to the apex of which is connected an axially consecutive longitudinal web and which is directed oppositely to the connected longitudinal web.

Finally, according to the invention, the rings and the longitudinal webs may be integral. This construction of the sleeve is particularly suited for manufacture from synthetic resin.

In order to facilitate the winding of threads and yarns to be treated on the sleeve, to improve the supporting of the threads and yarns by the sleeve, and to simplify the unreeling of the treated threads and yarns from the sleeve, it may also be provided with further elements in addition to the rings and longitudinal webs. Thus, for example, the sleeve may be provided in the zone of the shell with parts, issuing from the rings or longitudinal webs, and serving to locate the threads or yarns. In addition thereto, payout rings for the threads or yarns may be provided at the end faces of the sleeve shell.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a sleeve in the normal condition;

FIG. 2 is a plan view of the sleeve shown in FIG. 1;

FIG. 3 shows the same sleeve axially and radially compressed in side elevation; and

FIG. 4 is a plan view of the sleeve of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The textile sleeve shown in the drawing is made from a thermoplastic synthetic material. Its shell has peripherally extending, axially yielding rings **10**, and rigid longitudinal webs **11**, **12**, connecting these rings **10**. The rings **10** and the longitudinal webs **11**, **12** are made in one piece.

The rings **10** are arranged in equidistant spacing in the axial direction. In addition, the spacing between the longitudinal webs **11**, **12** is uniform in the peripheral direction. However, axially consecutive longitudinal webs **11**, **12**, or **12**, **11** are offset relative to each other by one half of their lateral distance.

The rings **10** have a zigzag configuration in which each section of each ring, located between two longitudinal webs **11** or **12**, has two legs **13**, **14**, or **14**, **13**. These legs **13**, **14** or **14**, **13** form an angle, the apex **15** or **16** of which is connected to an axially following longitudinal web **11** or **12** and which is directed oppositely to the connected longitudinal web **11** or **12**, respectively.

The cross section of the rings **10** is rectangular, with the narrow sides located on the inner and outer surfaces of the sleeve shell, whilst the wider sides extend substantially radially. The longitudinal webs **11**, **12** have a corresponding cross-sectional shape, but with a greater thickness than the rings **10**. Instead of the rectangular cross section of the rings **10**, and of the longitudinal webs **11**, **12**, their cross section may also be conical with an otherwise identical arrangement.

When the sleeve is axially compressed from the position shown in FIGS. **1** and **2** into the position of FIGS. **3** and **4**, the longitudinal webs **11**, **12** affect the rings **10** with a corresponding pressure, causing the rings **10** to yield in the longitudinal direction. During this, the gap between adjacent apices **15** and **16** of the rings **10** can be so far reduced that these apices are in contact with each other. Simultaneously, the distance between axially facing longitudinal webs **11** and **12**, respectively, and between peripherally adjacent longitudinal webs **11** or **12**, respectively, is correspondingly reduced. Consequently, when the sleeve is axially compressed, its axial reduction results necessarily also in a reduction of its diameter, as shown in FIGS. **3** and **4**.

However, the sleeve may also be reduced from the position of FIGS. **1** and **2** into the position of FIGS. **3** and **4** by means of radial compression. If the sleeve is radially compressed, the longitudinal webs **11**, **12** exert the same pressure on the rings **10**, as results from an axial compression. Thus, the rings **10** yield in the axial direction also under a radial compression of the sleeve, and the distance between adjacent apices **15** and **16** may be shortened until these are in contact with each other, whilst the distance between axially opposite longitudinal webs **11** or **12** and the distance between peripherally adjacent longitudinal webs **11** or **12** is correspondingly reduced. Consequently, also under radial compression of the sleeve, it is axially shortened simultaneously with its reduction in diameter.

Both under axial compression of the sleeve and under radial compression of the same, there results deformation of the rings **10**, i.e., of the angled legs **13**, **14** thereof, as shown in FIG. **3**. During this deformation, the angles at the apices **15** and the angles at the apices **16**, formed by the legs **13**, **14**, and **14**, **13**, respectively, become more acute.

I claim:

1. A sleeve of thermoplastic material for treatment of textile threads and yarns having a shell, wherein the shell comprises peripherally extending, spaced-apart rings which are elastically and plastically yielding in the axial direction of the shell, and spaced-apart rigid longitudinal webs connecting the rings, the axially consecutive longitudinal webs being laterally offset relative to each other.

2. A sleeve as claimed in claim **1**, wherein the rings are equidistantly spaced-apart along the axis of the shell and the longitudinal webs are equidistantly spaced-apart transversely around the shell and the axially consecutive longitudinal webs are offset relative to each other by one half of the transverse spacing.

3. A sleeve as claimed in claim **1**, wherein the rings are of corrugated configuration with kinking and bending points to serving to improve their yieldingness, the longitudinal webs being connected to the said kinking and bending points.

4. A sleeve as claimed in claim **3**, wherein the rings are of zigzag configuration and the section of each ring between two transversely consecutive longitudinal webs has two legs forming an angle, to the apex of which is connected an axially consecutive longitudinal web and which is directed oppositely to the connected longitudinal web.

5. A sleeve as claimed in claim **1**, wherein the rings and the longitudinal webs are integral.