March 4, 1969 K. NIMTZ ETAL 3,430,431

BALLOON RESTRAINER FOR TWO-FOR-ONE TWISTING MACHINE

Filed Aug. 4, 1967 Sheet 1 of 4

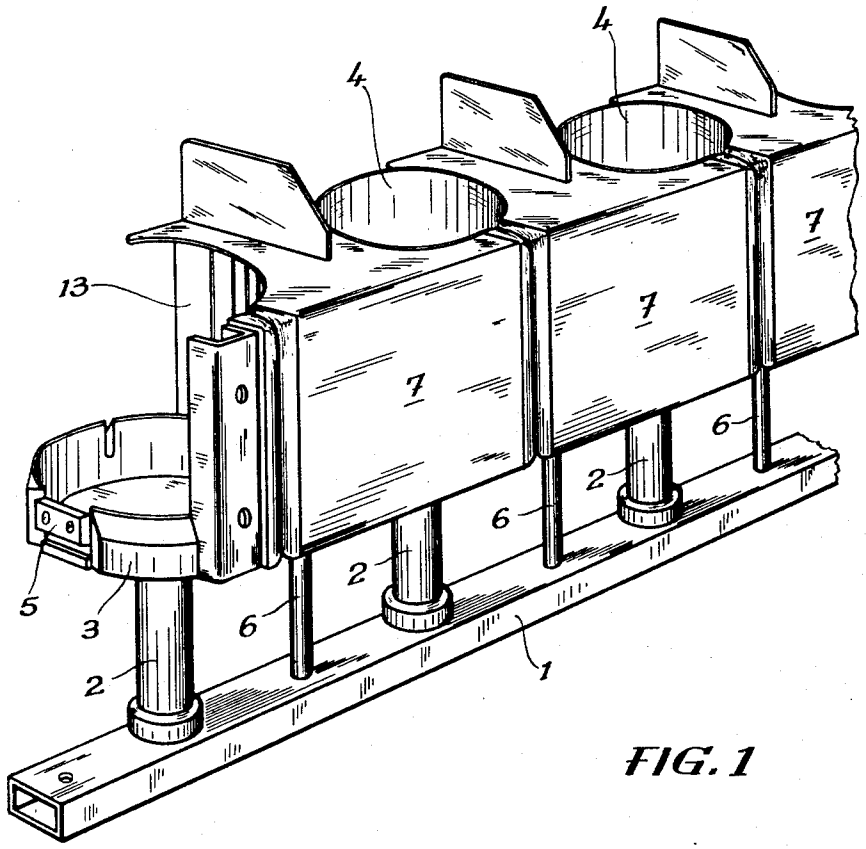


FIG. 1

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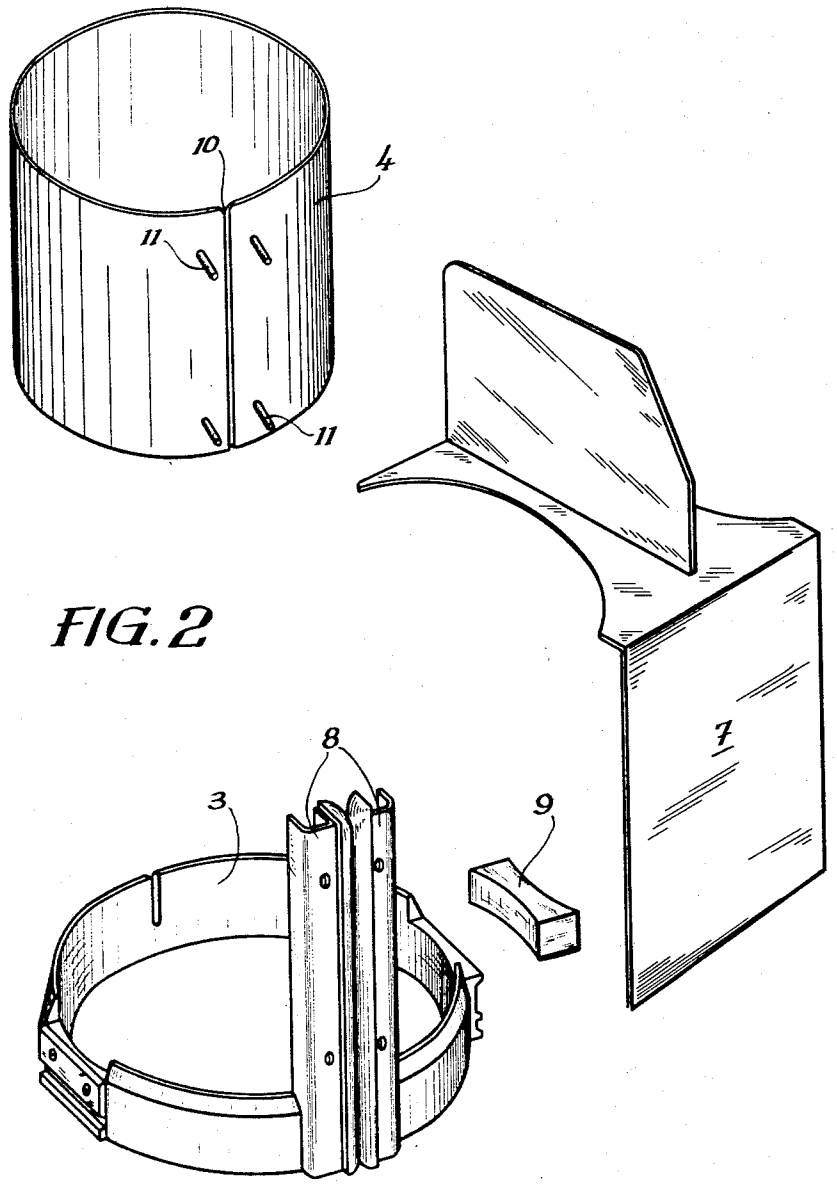


FIG. 2

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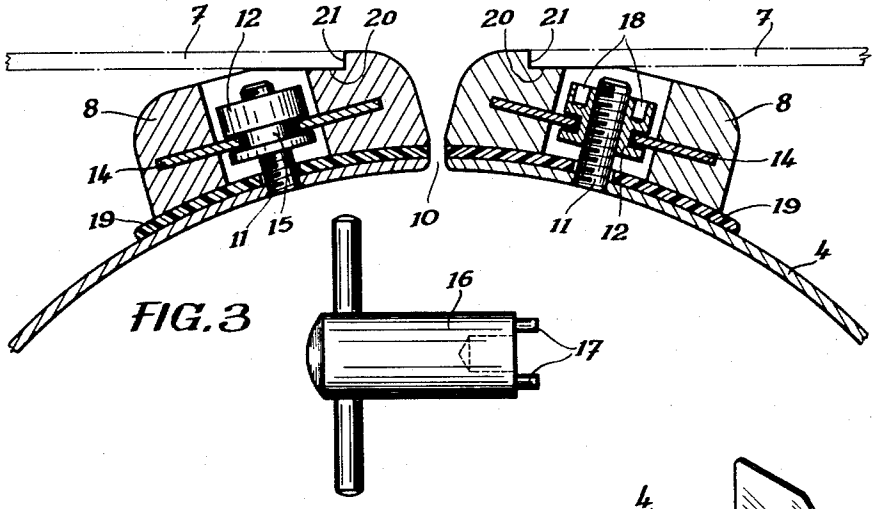


FIG. 3

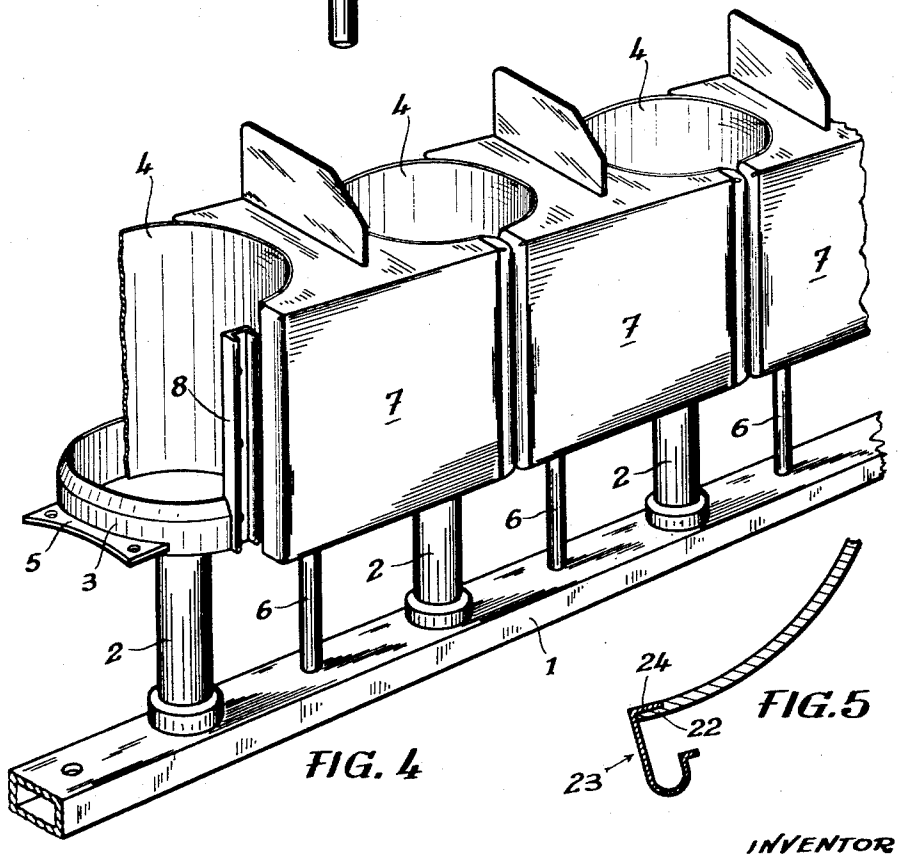


FIG. 4

FIG. 5

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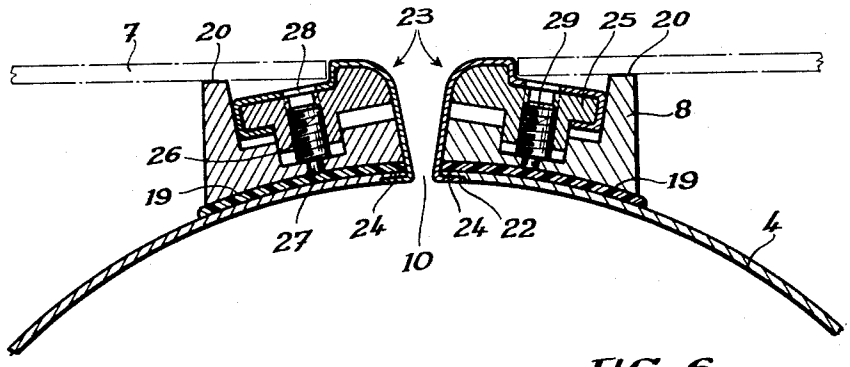


FIG. 6

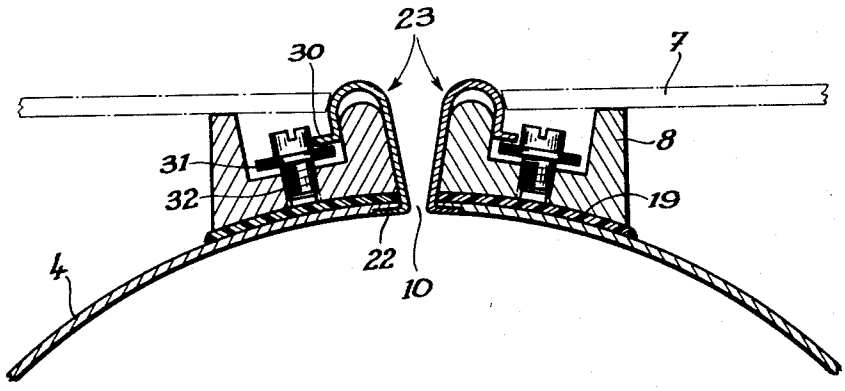


FIG. 7

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3,430,431

BALLOON RESTRAINER FOR TWO-FOR-ONE TWISTING MACHINE

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U.S. Cl. 57—108 11 Claims
Int. Cl. D01h *13/04, 7/86*

ABSTRACT OF THE DISCLOSURE

The present invention relates to a balloon restrainer for spindles of two-for-one twisting machines with a thin-walled slotted cylinder mantle supported by a supporting ring which surrounds the spindle at approximately the height of the turntable.

The invention is characterized primarily in that said supporting ring at both sides of the slot of said cylinder mantle has connected thereto one supporting column each which extends over the height of the cylinder mantle and is provided with adjusting means for selectively radially adjusting the cylinder mantle portions defining the slot of said cylinder mantle.

The present invention relates to a balloon restrainer two-for-one twisting machines. With heretofore known two-for-one twisting machines, the rotors of the individual spindles are at the respective spindle distance journalled on the spindle rail extending over the length of the machine, whereas the balloon restrainers and separating plates are connected to other parts of the machine frame which, when viewed from the operator's side, are located behind the spindles. In this connection there exists the difficulty that the spindles and balloon restrainers, when the machine is being assembled, have to be aligned individually with regard to each other.

In order to overcome this difficulty it has been suggested to mount the balloon restrainers at the respective spindle spacing in a unit composed of the individual elements and to support said unit on the spindle rail.

The balloon restrainers are formed by metallic cylinders or cylinders of synthetic material with slots extending in the longitudinal direction of the cylinders, and the cylinders are received in slotted holding rings. These holding rings are at both sides provided with fitting surfaces and firmly screwed to each other. Moreover, the said holding rings are provided with connecting eyes for mounting supporting legs, separating plates, and the like. Finally, the rings are equipped with magnets which in cooperation with countermagnets mounted on the bobbin carrier prevent the bobbin carrier from rotating together with the spindle rotor.

In this way, in cooperation with the spindle rail, there is formed a unit for a plurality of spindles which is preadjusted and as a unit inserted into the machine.

With slotted balloon restrainers, difficulties have been encountered again and again in connection with the alignment of the slot edges so that they will be in precise alignment with regard to each other. In order to prevent the thread balloon from engaging a protruding slot edge whereby the thread would be subjected to unnecessary stresses, it has been common practice so to arrange the slot edges that the edge from which the thread passes away slightly extends into the balloon chamber. In this way the movement of the thread onto the oppositely located edge will be prevented. This arrangement, however, makes it necessary that, when the direction of rotation is changed, the slot edges of each individual balloon restrainer are to be inverted. The above outlined difficulty cannot be completely overcome even with the above mentioned construction in which the slotted balloon restraining mantle merely in the vicinity of the lower edge is at both sides of the slot equipped with a thread pin with clamping nut extending through the holding ring. The connection of the balloon restrainer in the vicinity of the lower edge will give no assurance that the slot edges are precisely aligned with regard to each other over the entire length thereof.

It is, therefore, an object of the present invention to provide a balloon restrainer which will overcome the above mentioned drawbacks.

It is another object of this invention to provide a balloon restrainer in which the formation of a step between the slot edges of the cylinder mantle and thus a movement of the thread onto the respective slot edge will be prevented.

Since at any rate the slot edges of the bolloon restrainer are subjected to an increased wear by the thread hitting the same, it is a further object of this invention to provide means which will reduce this wear.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of three balloon restrainers which are combined to a unit and are connected to a spindle rail while being provided with cover elements.

FIG. 2 illustrates the elements of a balloon restrainer with a cover element according to FIG. 1.

FIG. 3 shows on an enlarged scale a horizontal section through the supporting columns of the balloon restrainer while illustrating more clearly the adjusting means for the slot edges.

FIG. 4 is a perspective view, slightly differing from that of FIG. 1, of a plurality of balloon restrainers with supporting column and cover elements which balloon restrainers are connected to a spindle rail.

FIG. 5 illustrates on an enlarged scale and in section a protective member which is non-detachably connected to the slot edge for adjusting the same.

FIG. 6 illustrates a horizontal section through the supporting column and cylinder mantle according to FIG. 4 while showing more clearly the adjusting means for the slot edges.

FIG. 7 is a section similar to that of FIG. 6 through a modified embodiment of the adjustable slot edges.

The present invention is based on a balloon restrainer of the above mentioned general type, namely a balloon restrainer for two-for-one twisting machines, with a thin-walled slotted cylinder mantle the lower rim of which is held in a likewise slotted ring which extends around the spindle at approximately the level of the turntable. This ring is adapted by means of fitting surfaces to be clamped to the holding rings of adjacent balloon restrainer.

The balloon restrainer according to the present invention is characterized primarily in that the ring has at both sides of its slot one vertically arranged supporting column each which extends over the height of the cylinder mantle and for purposes of aligning the slot edges is over the entire length thereof provided with adjusting means which are radially effective at both sides of the slot.

Thus, the cylinder mantle is in the immediate vicinity of its slot edges held on said supporting columns the adjusting means of which permit an alignment of the slot edges over the entire length thereof so that they are flush with each other and that no step is formed onto which the thread could move.

The adjusting means may consist of nuts which are rotatable in the supporting columns but are axially non-displaceable. These nuts engage threaded pins which are connected to the cylinder mantle on both sides of the slot so that by turning the nuts, the slot edges can be adjusted radially and can be aligned with regard to each other.

In order to be able to effect the adjustment in a simple manner from the outside by means of a wrench, the nuts are preferably designed as nuts for socket wrenches.

In order to avoid vibration, the supporting column may at that side which faces the cylinder mantle be provided with an elastic cushion which, when adjusting the slot edges of the balloon restrainer, is more or less compressed.

Experience has shown that the slot edges will wear prematurely even though they are in alignment with each other and form no step. This drawback of premature wear exists with all materials from which the balloon restrainer is normally made, with eloxated aluminum sheet metal or metal foils, above all, however, with impregnated and non-impregnated synthetic materials, as for instance the material known under the trademark Teflon, which is a polytetrafluoroethylene, or with foils consisting of a plurality of synthetic layers which have a low frictional value but are sensitive to impact at the slot edge.

It is, therefore, as mentioned above, an object in connection with the adjustment of the slot edges of the cylinder mantle to protect the slot edges against wear and to make the same non-sensitive against impact in order thereby to extend the life of the cylinder mantle. In order to solve this problem, it is suggested according to the present invention that the supporting column have a U-shaped cross section and that the adjusting means have associated therewith rail-shaped protective yokes which extend over the length of the supporting columns and are angled a plurality of times. These rail-shaped yokes have a leg which is flush with the inner surface of the cylinder mantle and from the inside engage a set back step of the slot edges of the cylinder mantle and, while compressing the cushion more or less, secure and determine the slot edges on the supporting columns.

Due to the fact that the adjusting means have associated therewith protective yokes of particularly wear-resistant material, as for instance steel, which have a leg in engagement with the slot edges, it will be assured that the slot edges of the balloon restrainer proper will not be subjected to wear. This is due to the fact that they are protected by said yokes the wear-resistance of which is considerably higher with regard to the thread, especially the impact thereof.

The wear-resistance may be increased still further according to the present invention by having the protective yokes at least within the impact area of the thread especially hardened or coated with a particularly wear-resistant coat, for instance of hard chromium. In this way the life of the balloon restrainer will be considerably increased. Inasmuch as the legs of the protective yokes which face the thread balloon are in alignment with the inner surface of the cylinder mantle, the thread will during its rotation smoothly pass over the same, particularly inasmuch as it follows a slightly helical path.

The adjusting means do not act directly but indirectly upon the slot edges through the intervention of the protective yokes while the possibility of aligning the slot edges is completely maintained because the interposed elastic cushion can be compressed more or less.

In some instances it may be advantageous according to the invention non-detachably to connect to the slot edges the legs of the protective yokes which engage the slot edges of the cylinder mantle.

For clamping the protective yokes to the supporting columns there may, in conformity with the present invention, be provided clamping elements which engage the protective yokes from the inside and which are adjustable

radially with regard to the cylinder mantle through the intervention of threaded studs screwed into said clamping members and adapted to be turned through cutouts in the protective yokes. These threaded studs rest on the groove bottom of supporting columns having a substantially U-shaped form.

By providing the threaded studs which are accessible from the outside, for instance in the hexagonal shape, into which a socket wrench can be inserted, the adjustment of the slot edges can be effected in a particularly simple manner. For purposes of further simplifying the construction, it is possible in conformity with the present invention to provide the protective yokes with a leg extending around the leg of the supporting columns which faces the slot. The leg of said protective yokes ends in a flange which is, for purposes of clamping fast the protective yokes, engaged from the inside by annular flanges of adjusting nuts screwed into the supporting columns and arranged along said supporting columns in spaced relationship to each other.

In this way special clamping members are not required because the adjusting screws engage the protective yokes directly so as to align the same relative to each other and thereby to determine the slot edges. In order to obtain a closed box-shaped structure free from undesired spaces or corners for the deposit of lint, cover elements are provided between the spindles as they are known per se in connection with balloon restrainer constructions. In order to mount such cover elements, the protective columns may, according to the present invention, on both servicing sides be provided with plane supporting surfaces.

Referring now to the drawings in detail and, more specifically, to the arrangements of FIGS. 1 and 4, the devices shown therein comprise a spindle rail **1** having journalled thereon spindles **2** spaced in conformity with the machine division. The balloon restrainers associated with the individual spindles primarily comprise each a holding ring **3** and a cylinder mantle **4** inserted into the ring **3** and provided with a longitudinal slot **10**. The cylinder mantles **4** may consist of metal or any suitable synthetic material. Depending on the material employed, the wall thickness of the cylinder mantle may vary in most instances from 1 to 2.5 millimeters. A plurality of holding rings **3** are along the lateral surface **5** fixedly connected to each other by screws. Furthermore, the holding rings **3** are equipped with supporting feet **6** which in their turn are connected to the spindle rail **1** so that the balloon restrainers together with the spindle rail **1** form a unit which can be preset and can be inserted as an entirety into the respective machine field. The spaces between the spindles **2** are closed by cover elements **7** which are preferably made of cast light metal whereby the said spaces are protected against the deposit of lint or the like.

The structure of a balloon restrainer can best be seen from FIG. 2. For purposes of connecting the slotted cylinder mantle **4**, the holding ring **3** which is likewise slotted for introducing the thread is at both sides of its slot provided with supporting columns **8** which preferably have a U-shaped cross section.

The cylinder mantle **4** has at both sides of its slot **10** threaded pins **11** which are threadedly engaged by nuts **12** received in the supporting columns **8** in a manner described further below. FIG. 2 also shows a magnet **9** which by means of a filling member **13** adapted to the contour of the respective cylinder mantle and interposed between two balloon restrainers is held in position and in cooperation with a countermagnet prevents the bobbin carrier to rotate together with the spindle rotor. The filling members **13**, one of which is shown in FIG. 1, are preferably made of synthetic material and pressed preferably around the magnets **9**.

FIG. 3 illustrates the adjusting means engaged by the

threaded pins 11 of the cylinder mantle 4 for aligning the slot edges of the cylinder mantle 4.

The lateral legs of the U-shaped supporting column 8 are provided with longitudinal grooves for receiving forked holding plates 14. The inner edges of the holding plates 14 engage a circumferential groove 15 in the nuts 12. In this way the nuts 12 can be rotated but are axially non-displaceably held in the supporting columns 8. In order to be able to turn the nuts 12 from the outside, it is merely necessary to insert a socket wrench 16 with its studs 17 into bores 18 provided in the end faces of the nuts 12. By turning the nuts 12, the slot edges of the cylinder mantle 4 are through the intervention of the threaded pins 11 adjusted in radial direction. The slot edges can in this way be so adjusted that they are flush with each other.

For purposes of preventing vibration, the supporting columns 8 have that side thereof which faces the cylinder mantle 4 provided with an elastic cushion 19 of foam material or the like which can be compressed more or less when aligning the slot edges.

FIG. 3 furthermore shows the plane supporting surfaces 20 of the supporting columns 8 which end in the steps 21.

Between the steps 21 of each two adjacent balloon restrainers the cover elements 7 located between the spindles are firmly held against the surfaces 20.

According to FIG. 4, the supporting columns 8 of substantially U-shaped cross section have associated therewith rail-shaped protective yokes 23, for instance of steel, which extend over the entire length of said columns 8 and have a multi-angled cross section. The leg 24 of each member 23 engages from the inside the slot edges of the cylinder mantle 4. The cushions 19 of elastic yieldable material are interposed between the supporting column 8 and the cylinder mantle 4. The slot edges of the cylinder mantle 4 are provided with an inwardly offset step 22 so that the legs 24 of the members 23 (see in particular FIG. 5) are flush with the inner surface of the cylinder mantle 4 and represent a smooth thread path. In many instances it is advantageous to non-detachably connect the legs 24 of member 23 with the steps 22 of the slot edges of the cylinder mantle 4.

In order to be able to adjust the members 23 and thereby the slot edges of the cylinder mantle 4 in radial direction, clamping members 25 corresponding to the inner contour of the members 23 are inserted into the latter, said clamping members 25 having the same length as the members 23 and supporting columns 8.

The clamping members 25 are provided with thread bores extending over the length of said clamping members 25 and threadedly engaged by the threaded studs 26. The threaded studs 26 rest primarily at the bottom of the groove in the U-shaped supporting column 8 while the stud-shaped ends 27 are received in guiding bores of said columns 8. When the threaded stud 26 is rotated in clockwise direction, the clamping members 25 and thereby also the protective yokes 23 are moved radially outwardly so that the legs 24 of said members 23 will pull the slot edges of the cylinder mantle 4 toward the supporting columns 8. In this way, depending on the rotation of the threaded studs 26, the slot edges of the cylinder mantle 4 can be aligned so that they are flush with each other while the cushions 19 are compressed to a lesser or greater extent.

In order to make the threaded studs 26 accessible from the outside, the members 23 are provided above said studs 26 with bores 28 through which a socket wrench can be passed. Thus, the adjustment of the threaded studs 26 is effected in the particular embodiment shown, by a socket wrench inserted into the inner hexagon 29 in the studs 26.

FIG. 7 shows a simplified modification according to which the clamping elements 25 are eliminated. More specifically, the protective yokes 23*a* are bent in such a way that they extend around that leg of the supporting columns 8 which faces the slot 10, and form in the groove of the supporting column a flange 30 which is directed transverse thereto. Flange 30 is, from the inside thereof, engaged by the annular flange 31 of the adjusting screws 32 screwed into the column 8. The head of said adjusting screws 32 is free and accessible to a screw driver and is, for actuation by the latter, provided with a slot 33.

When the adjusting screws 32 are turned in counterclockwise direction precisely as with the embodiment of FIG. 5, the slot edges of the cylinder mantle 4 are pulled toward the supporting columns 8 and while the cushion 19 is compressed more or less are properly located and aligned to each other.

Due to the fact that the slot edges are embraced by the legs 24 of the wear-resistant protective yokes 23, the edges proper are not subjected to any wear by the circulating thread so that the balloon restrainer has a nearly unlimited life. The protective yokes 23 may at least within the range of the angled-off leg 24 be hardened or be coated with a particularly wear-resistant coat as, for instance, hard chromium.

What we claim is:

1. A balloon restrainer for spindles of two-for-one twisting machines which includes a supporting ring, a thin-walled cylinder mantle supported by said supporting ring and having a longitudinal slot extending in the longitudinal direction of said cylinder throughout the length thereof, two supporting columns respectively arranged on opposite sides of said slot and adjacent thereto while being connected to said ring and extending over the length of said cylinder mantle, and adjusting means respectively supported by said columns and operable to act radially upon the slot defining portions of said cylinder to adjust the slot defining edge portions of said cylinder.

2. A balloon restrainer according to claim 1, in which said supporting ring is provided with lateral connecting surface means for detachable connection with a corresponding supporting ring of a corresponding balloon restrainer pertaining to an adjacent spindle.

3. A balloon restrainer according to claim 1, in which said adjusting means include threaded pins arranged in both sides of said slot and connected to said cylinder mantle while extending into said columns, nuts threadedly engaged by said pins and rotatable relative thereto, and means for preventing axial displacement of said nuts relative to said supporting columns.

4. A balloon restrainer according to claim 3, in which said nuts are socket wrench operable nuts.

5. A balloon restrainer according to claim 1, which includes elastic cushion means respectively interposed between said supporting columns and the respective adjacent portions of said cylinder mantle.

6. A balloon restrainer according to claim 5, in which said supporting columns have a U-shaped cross-section, and in which said cylinder mantle at the inside thereof and at both sides of said slot has a step so that said mantle portion which is located on the slot side of said step is thinner than the mantle portion on the opposite side of said step, and two protective rail members respectively associated with said columns, each of said rail members having a leg engaging the respective adjacent step so that the leg surface facing away from the adjacent supporting column is substantially flush with the adjacent inner mantle surface, said rails extending over the length of said cylinder mantle and the slot edges thereof and defining the effective slot of the balloon restrainer.

7. A balloon restrainer according to claim 6, in which said protective rail members are hardened and particularly wear resistant at least within the possible area of contact with a thread being processed.

8. A balloon restrainer according to claim 6, in which said protective rail members are non-detachably connected to the slot edges of said cylinder mantle.

9. A balloon restrainer according to claim 6, which includes clamping members respectively arranged within said protective rail members, and screw means respectively supported by said supporting columns and threadedly engaging said clamping members for selectively adjusting said clamping members at least approximately radially with regard to said cylinder mantle to thereby clamp said protective rail members to said supporting columns.

10. A balloon restrainer according to claim 6, in which each of said rail members has an additional leg which extends over that leg portion of the respective adjacent supporting column of U-shaped cross-section which is adjacent said balloon restrainer slot, said additional rail member leg comprising a flange, and said adjusting means including screw means adjustably moved into said supporting columns and provided with flange means for engagement with the respective adjacent rail member leg flange.

11. A balloon restrainer according to claim 1, in which the outside of said supporting columns is provided with a plane surface for receiving cover plate means to protect said balloon restrainer against the deposit of lint and dust.

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U.S. Cl. X.R.

57—58.83