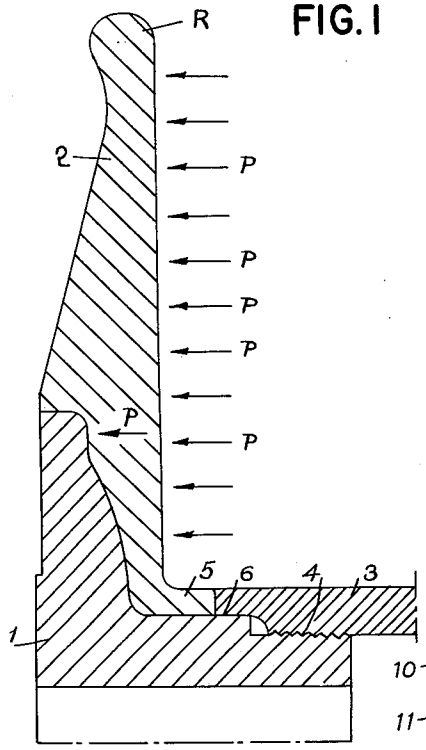
July 30, 1963 P. PORTAL 3,099,417

REINFORCED SPOOL

Filed Dec. 21, 1960

FIG. 1



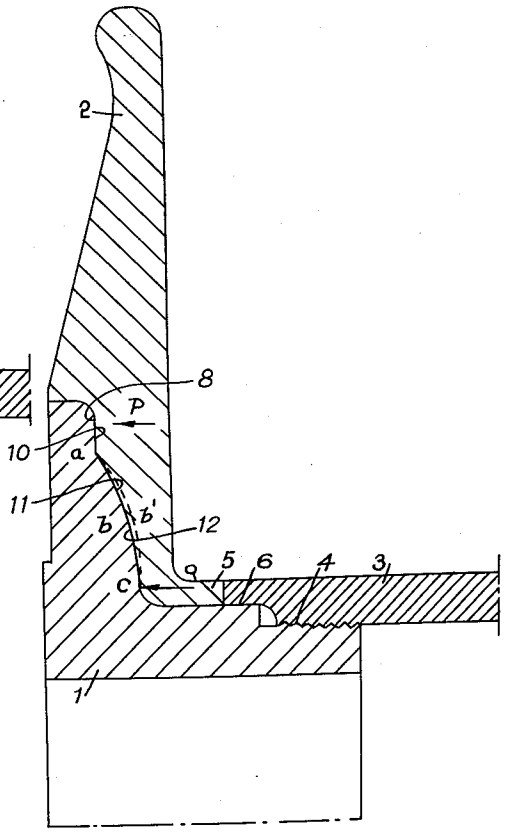


FIG. 2

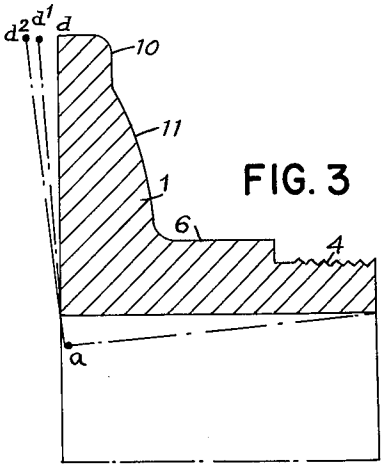


FIG. 3

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REINFORCED SPOOL

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The present invention has the purpose of limiting to a minimum the distortions of spools or yarn-beams while they are being filled with yarn.

The spools or yarn-beams are of very varied types and made of all kinds of raw material according to the intended utilization.

The yarns are mechanically wound on the spools under tension. The sum of these tensions sets up very considerable radial stresses on the cylindrical barrel and horizontal forces on the side plate which tend to create a lengthening of the barrel under these stresses and distortion of the side plates.

This means:

(1) That there is a limit in filling the spools with yarn for two reasons:

The horizontal stresses due to the pressure exerted by the yarns by the side plates tends to deform or push the side plates apart. This side plate movement must not reach a width sufficient to allow a yarn belonging to one sheet to slip between the yarns of an immediately underlying sheet by taking advantage of the loosening of the latter sheet owing to the increase in the space between these two side plates. During weaving or knitting, this yarn being no longer in the correct position would be inclined to break.

Also, if the distortions exceed the permissible mechanical stress, they might cause the spool to explode or fly apart, leading to serious accidents.

(2) That the mechanical operations of warping, weaving or knitting are hindered by these distortions, and in particular, they cause a reduction in the productive capacity of knitting looms.

Also, the dimensions of the spools are standardized and there is no possibility of altering these standardized dimensions, for example, the thickness of the side plates.

The present invention has the object of reinforcing the side plates so as to prevent their distortion under the action of the stresses exerted by the yarns wound on the spool.

The invention also has as an object: To double the speed of warping, to double the load of yarn on an ordinary spool, to insure very long and durable service for spools by a minimum fatigue of materials, to insure perfect balance, to insure economical manufacture, to permit easy repair, and to insure maximum productivity.

Other purposes and advantages will be revealed by the accompanying description and the drawings, in which:

FIGURE 1 shows, in section, one end of a spool, with a diagrammatic representation of the stresses exerted by the yarns on the end plate;

FIGURE 2 shows, in section, one end of the spool similar to FIGURE 1, to show the play provided between the boss or hub member and the crown or rim member; and

FIGURE 3 is a sectional view of the boss or hub member.

According to the invention and without altering the dimensions or the quality of the contact between the yarn and the yarn beam, a side plate is made with a "reinforced" construction. The reinforcement allows the horizontal forces due to the windings of the yarn on the spool to be taken up by a steel boss or hub member **1** which screws into the connecting tube **3**.

The shape of the boss or hub member **1** is arranged so as to obtain minimum distortion without changing the overall dimensions, and to obtain a minimum weight.

Known spools have been made with three elements: Two light alloy machined forged side plates, mounted by welding or assembled with screws on a light alloy tube.

According to the invention, each of the side plates is made of two elements: A light alloy crown or rim member **2** which remains in contact with the yarn and a steel boss or hub member **1** which receives the horizontal forces P of the yarn. This boss, to have a maximum strength is constructed so that the crown or rim member **2** is axially supported at the annular face **8** by the rim portion **10** of the boss or hub member **1** at approximately the center of pressure P of the yarn on the crown or rim member.

In manufacturing, the convex curved surface **11** shown at A—B—C of the steel boss or hub member **1** is not in contact with the concave curved surface **12** shown at A—B¹—C of the light alloy crown or rim member **2**. A slight play is sufficient and insures that the axial support is located in alignment with the center of pressure P. When filling, the crown will, little by little, be displaced back against the boss or hub member, closing the recess. This produces a force couple tending to resist axially outward movement of the edge R or dishing of the crown or rim member **2**.

This steel boss or hub member limits the bending of the side plates, on the one hand, from D to D1, as shown in FIGURE 3, and also prevents rotation of the section to A and D2. Therefore the edge R is not displaced in any appreciable extent because of the rigidity provided by the steel with its inherent high modulus of elasticity.

In its central part, each crown or rim member **2** has a portion **5** forming a bushing which cooperates with a cylindrical bearing portion **6** on the boss or hub member **1**.

The side plates are assembled on the spool by screwing the threaded portions **4** of the bosses or hub member **1** onto the tube **3**, the crown or rim member **2** being secured between the bosses and the tube by means of the portions **5** and **6**.

The steel reinforcement of the side plates allows a considerable filling of the spool with synthetic yarn in normal knitting or weaving service.

Owing to its strength, the spool enables an increase in and even the doubling of warping speeds, and hence allows very considerable economies in expensive equipment.

It is quite obvious that the invention is not restricted to the example of the embodiment described above, from which alternatives may be provided without going outside of the scope of the invention.

What I claim is:

1. A reinforced spool for textile machinery comprising two side plates, a connecting tube, said connecting tube being mounted between said side plates and secured to each of said side plates at its ends, each of said side plates comprising a hub member having a radially outwardly extending rim portion and a rim member having a radially outwardly extending portion of greater diameter than said rim portion disposed between said rim portion and an end of said connecting tube, each rim member also having a central portion abutting against said connecting tube, the modulus of elasticity of the material of said hub member being substantially higher than that of the material of said rim member, each of said rim members having areas of engagement with said hub member adjacent the central portion of said rim member and adjacent the outer periphery of the outwardly extending rim portion of said hub member, each of said rim members and its associated hub member having slightly spaced

annular surfaces located radially between said areas of engagement and adapted to be pressed into contact by the forces exerted by windings on said spool.

2. A reinforced spool for textile machines comprising two side plates, a connecting tube, said connecting tube being mounted between said side plates and secured to each of said side plates at its ends, each of said side plates comprising a hub member and a rim member, the modulus of elasticity of the material of said hub member being substanitally higher than that of the material of said rim member, said hub member being formed with a rim portion normally engaging and axially supporting said rim member at a point radially spaced from said tube, said hub member and said rim member being normally spaced from each other by an axial gap in the radial zone between the outer periphery of said tube and said point of engagement, whereby yarn wound on said spool engaging said rim member radially inward of said rim portion resists axial deflection of said rim member under the influence of engagement thereof with yarn at locations radially outward from said rim portion, and the windings on a full spool cause limited defleciton of said hub member and said rim member to close said axial gap and allow said hub member to provide abutting supporting for said rim member at all points between the outer periphery of the tube and said point of engagement.

3. A reinforced spool for textile machines comprising two side plates and a connecting tube mounted between said side plates and secured to each of said side plates at its ends, each of said side plates comprising a hub member secured to said connecting tube and a rim member secured between said hub member and said tube, the modulus of elasticity of the material of said hub member being substantially higher than that of the material of said rim member, said rim member presenting an inner radial face extending outward from the outer periphery of said connecting tube to support the windings on said spool, said rim member being formed on its outer side with an annular face spaced radially outward from the outer periphery of said tube, said rim member having a concave surface extending radially and axially inward from said annular face, said hub member having a rim portion making preloaded engagement against said annular face on said rim member to support the latter against

axially outward deflection, said hub member having a convex surface adjacent the concave surface on said rim member and normally spaced therefrom by an axial gap when said spool is empty, whereby yarn wound on said spool exerting an axial force on said rim member deflects said rim member and said hub member a limited distance to close said axial gap and allow said hub member to provide abutting support for said rim member along said concave surface and at said annular face.

4. A reinforced spool for textile machinery comprising two side plates, a connecting tube, said connecting tube being mounted between said side plates and secured to each of said side plates at its ends, each of said side plates comprising a hub member and a rim member, the modulus of elasticity of the material of said hub member being substantially higher than that of the material of said rim member, each hub member including a rim portion extending radially outwardly on the outer side of the adjacent rim member and engaging the same at a zone of contact adjacent the center of the force exerted by the windings against said side plates, said hub member and said rim member having annular surfaces inward of said zone of contact initially spaced from each other by an axial gap and capable of engaging each other upon outward deflection of said rim member, said hub member and said rim member also making engagement at a second zone radially inward of said annular surfaces, each rim member being mounted between said hub member and said connecting tube under a preloaded force which opposes outward flexing in service, the center of said preloaded force being applied by each of said hub members to its rim member at a radius at least as great as the radius of the center of force exerted by the windings on a full spool against said side plates.

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