Dec. 30, 1952 F. C. SORTON 2,623,709

YARN BEAM

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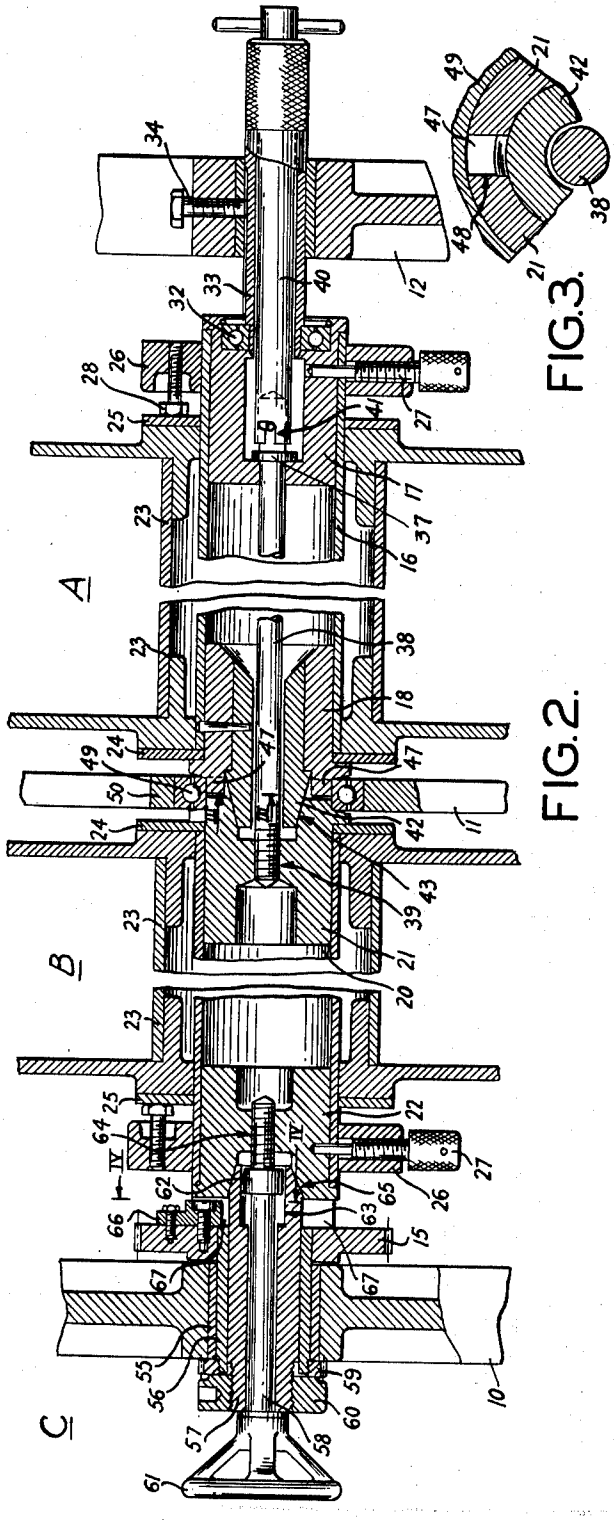


FIG. 2.

FIG. 3.

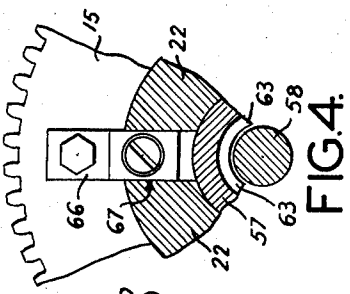


FIG. 4.

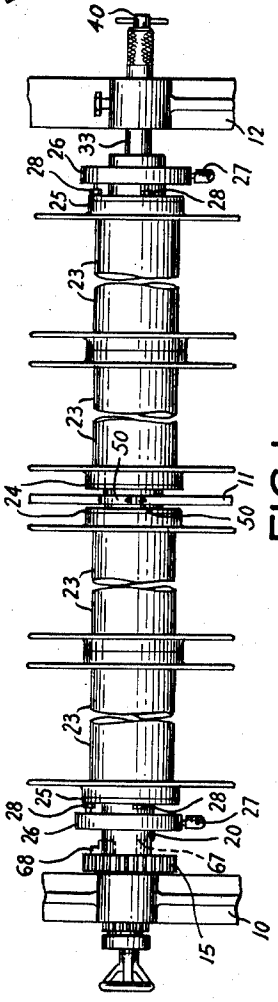


FIG. 1.

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YARN BEAM

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My invention relates to yarn beams, and particularly to yarn beams for warp knitting machines, and for conciseness and simplicity I shall refer hereafter only to yarn beams for warp knitting machines. However the invention can be applied to yarn beams for looms also if desired, as will be both apparent and understood from the description of the application of the invention to warp knitting machines which follows.

The yarn beams of warp knitting machines are quite long frequently, and for convenience of handling are made in a number of sections, usually two sections, assembled end to end. Each section is supported at its two ends on members of the frame of the machine, and commonly the adjacent ends of the sections are coupled together by means of intermeshing dogs or something of the sort in order that in supplying yarn the sections of the beam may rotate as one so far as reasonably possible. Also the beam assembly (whether the beam itself comprises a number of sections or only one) usually includes at least one element for controlling the rotation of the beam, for example the drum of a brake, or a gear for connecting the beam to, for example, a brake mounted on the frame of the machine. Usually such a rotation-controlling element is incorporated in what is, in effect, an additional section of the beam assembly, and is connected to the beam, or to sections of the beam, in generally similar manners, i. e. by intermeshing or interlocking dogs or something of the kind.

Such connections however have not been wholly satisfactory.

Speaking generally, the present invention provides a yarn beam assembly in which the sections are connected to each other in such a manner that not only can a filled beam or spool be substituted readily for a beam or spool from which the yarn has been run off, but also the adjacent sections are connected together so firmly that they act effectively as a unit despite the great stresses to which such connections are subjected sometimes.

Briefly, according to the invention, sections of the yarn beam assembly, at least one of which is a thread-carrying section, are drawn together longitudinally. Preferably they are thus drawn, one to another, over tapered centering pins. Preferably also the sections are provided in addition with intermeshing connections of some sort, such as intermeshing teeth, slot-and-pin connections, key-and-slot, etc., i. e. connections of a type tending to prevent relative angular

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"thread-carrying section," it will be understood, are used here as meaning a spool or a yarn beam adapted to carry one or more spools.

The preferred form of the invention is illustrated in the accompanying drawings in which Fig. 1 is an elevation of illustrative portions of a yarn beam assembly embodying the invention, there being shown also parts of a warp knitting machine in which the beam is mounted and several empty yarn spools mounted on the beam. Fig. 2 is a longitudinal section of the two ends and the center portion of the mechanism of Fig. 1. Figs. 3 and 4 are cross sectional views on the lines 3—3 and 4—4 of Fig. 2.

The yarn beam assembly of the drawing is mounted in three vertical members 10, 11 and 12 of a warp knitting machine. This yarn beam assembly consists of an assembly section A which contains one section of the yarn beam, a second assembly section B which contains a second section of the yarn beam, and a third assembly section C which contains the rotation-controlling element 15. In the present instance this rotation-controlling element 15 is a gear by which the yarn beam sections may be connected to a brake, or by which conceivably more or less of the power to turn the beam may be supplied. For the present purposes however it can be assumed that the beam is rotated by tension applied to the yarns, that this tension is applied and the yarn is drawn off intermittently, and that the gear 15 connects the assembly to a brake intended to stop the rotation of the beam whenever the tension on the yarns is removed and hence prevent overrunning of the beam.

The first section of the yarn beam itself comprises primarily a hollow tube 16 and two plugs 17 and 18 fixed in the ends of the tube and by which it is mounted and is connected to the second assembly and beam section. Similarly the second section of the yarn beam comprises primarily a tube 20 and two plugs 21 and 22 fixed in the two ends of tube 20 for mounting and connections. In the present instance the yarn is intended to be wound on spools 23, a number of which are mounted end to end on each beam section. To fix its line of spools to the tube 16, this tube has an annulus 24 fixed to one end of it, a second annulus 25 loose on the opposite end of the tube, and a ring 26 at the latter end of the tube that can be slipped off the tube at will or locked to the tube by one or more threaded bolts 27. The ring 26 carries a number of threaded bolts 28 that can be turned into engagement with

stitute filled spools 23 for the empty spools 23 shown on the beam or beam section tube 16, the beam or section first is removed from between the frame members 11 and 12 (as by procedure described later), and then its bolts 28 are loosened from its annulus 25, and its ring 26 and annulus 25 are removed successively from the beam. The empty spools 23 are then slipped off the beam, and, say, a similar number of similar spools filled with yarn are slipped onto the beam tube 16. The first of the filled spools is thrust against the fixed annulus or flange 24 (Figs. 1 and 2) and each thereafter in succession is thrust against the next (Fig. 2). When the proper number have been put on the beam, the loose annulus 25 is slipped onto the tube 16 again and thrust against the last spool (Fig. 2, the annulus serves to protect the spools from the bolts 28), the ring 26 is slipped onto the tube, and then is locked to the tube by the bolt or bolts 27. Then the bolts 28 are turned to thrust their heads against the annulus 25 tightly. This serves to lock the spools 23 to the tube 16 and beam, both longitudinally and rotatably, and carrying the filled spools the section can be restored to its place on the machine. The tube 20 of the second section is provided similarly with annuli 24 and 25, and a ring 26 and bolts 27 and 28, all of which are operable in a similar manner. It is to be understood however that the foregoing is only a convenient arrangement for fixing yarn spools to a beam. It forms no part of the present invention. The invention is not limited either to such a spool-attaching arrangement or to beams which carry their yarns on spools.

Conveniently too the right-hand end of section A is supported by a bearing 32 which is anchored in the end of its plug 17 and which, when the section is in place in the machine, is carried by an elongated member 33 which is slidably mounted in the adjacent frame member 12. The end of the member 33 on which the bearing 32 is carried is so sized that it can be slipped into and withdrawn from the bearing readily. A bolt 34 is provided to releasably clamp the elongated member 33 in beam-carrying position. The frame member 12 is spaced sufficiently from the adjacent end of the section A when the latter is in operating position, Fig. 2, to permit the section to be moved, when the clamp 34 is released, far enough toward the member 12 to withdraw the opposite end of the section from its bearing 59 at its opposite end and from the section B. This construction permits the section A to be removed readily from the machine for the substitution of a filled beam section for an empty one, or for the substitution of filled spools for empty ones on the beam.

In accordance with the invention, a bar 38 is provided within and coaxial with the beam tube 16. It is mounted slidably and rotatably in the plugs 17 and 18, and provided with a collar 37 engageable with a surface on plug 17 to limit its movement toward the section B. At the plug 18, the end of the bar 38, which is threaded, projects from the beam section, and at a complementary place the plug 21 of the section B is provided with a threaded bore 39 into which the end of the bar 38 is threaded to draw the two sections A and B together longitudinally. In order to rotate the bar 38 to screw it into and unscrew it from the bore 39, the elongated member 33 is made hollow and a key or wrench 40 is provided to reach through the member 33 to the adjacent end of the bar (Fig. 2). The engagement between the end of the bar and the wrench may be, for example, by a pin and bayonet slot as shown at 41.

Preferably a tapered centering pin 42 is provided around the bar 38 at the plug 18, and a recess 43 to receive the tapered pin, say similarly tapered, is provided in the adjacent plug 21 of the section B. Preferably the centering taper either is formed on the plug 18 or is fastened to the plug, say as indicated. Additionally the face of the plug 18 is provided with one or more longitudinally projecting dogs 47 closely fitting in complementary slots 48 in the adjacent face of the plug 21 of the section B, the dogs and slots being displaced radially from the centerlines of the connecting bar 38 and the sections A and B and accordingly forming complementary elements of an intermeshing connection tending to prevent angular displacement of one of these two sections with respect to the other (Figs. 2 and 3). These two adjacent ends of the sections A and B are supported by a bearing 49 into which set both the dogs 47 and the portion of the plug 21 in which the slots 48 are formed. This bearing in turn is carried by the frame member 11 of the knitting machine, and a removable cap 50 is provided to hold the bearing to the frame member.

The relations are such that the threading or turning of the bar 38 of section A into the bore 39 of section B serves to draw the walls of the recess 43 onto and in contact with the taper of the pin 42, and draw the dog or dogs 47 into the slot or slots 48, and thus attach the two sections together firmly by longitudinal action.

The third section C of the beam assembly supports the opposite end of the section B and contains the rotation-controlling element 15 (driver or restrainer). Speaking generally the rotation-controlling section C is connected to section B in a similar fashion. This section C is mounted in a beairng 55 which is carried by the machine frame member 10. Primarily the section consists of a sleeve 56 within the bearing 55 and carrying the rotation-controlling gear 15, a centering pin 57 coaxial of and slidable within the sleeve 56 and tapered at its end adjacent section B, and a threaded bar 58 substantially coaxial with and slidable within the centering pin 57. The gear 15 and a collar 59 on the two ends of the sleeve 56, engageable with the opposite side of, say, the frame member 10, retain the sleeve within the bearing. A collar 60 on the outer end of the centering pin 57 and engageable with the outer end of sleeve 56, limits the movement of the pin toward the section B. The bar 58 is provided with a hand wheel 61 on its outer end for rotating the bar; the bearing of this hand wheel against the outer end of the centering pin 57 limits the inward movement of the bar. A collar 62 on the threaded bar 58 and slidable in an elongated bore 63 in the inner end of the centering pin 57, helps to center the inner end of the bar 58 which carries the threads. The adjacent plug 22 of the beam assembly section B is provided complementarily with a threaded bore 64 into which, in operating position, the bar 58 is threaded. It is provided also with a recess 65 in which the tapered end of the centering pin 57 is received when the parts are in operating positions (Fig. 2); as shown the recess 65 may be tapered similarly to the tapered end of the centering pin. One or more keys 66 on a face of the rotation-controlling gear 15, and a complementary slot or slots 67 in the adjacent face of the plug 22 (Figs. 2 and 4), provide an intermeshing connection, dis-

placed radially from the centerline, tending to prevent relative angular motion between the two sections B and C. Again the relations are such that screwing the longitudinal threaded bar 58 into the bore 64 draws the two sections B and C firmly together, seats section B on the taper of the pin 57, and locks the elements 66 and 67 of the intermeshing connection in intermeshing relation, and accordingly fastens the two sections together both longitudinally and firmly.

When it is desired to remove the beam sections from the machine for, say, the substitution of filled spools for empty spools 23, provision is first made for supporting the first section A as this section is withdrawn from its supports on the machine; for example, it may be slung to a crane. The key or wrench 40 is then used to unscrew the threaded bar 38 from the plug 21 of the second section B, and usually retract it into the plug 18; then the clamp 34 is released, and then the member 33 is slid out of the bearing 32 and well to the right in Fig. 2. The whole section A is then moved bodily to the right until the dogs 47 are pulled out of the bearing 49 and the tapered pin 42 and threaded bar 38 are fully outside the recess 43 of the second section B; the spacing provided for between the supporting member 12 of the knitting machine and the first section A when the latter is in operating position (Fig. 2), is made sufficient to permit this action as before noted. When the section A has thus been freed from the right-hand supporting member 33 and its left-hand bearing 49 and the section B, the section A is carried away from between the frame members 11 and 12 and to some convenient place where the empty spools can be removed from the beam tube 16 and replaced by filled spools as before described. After the section A has been taken away (or at least released from B and the bearing 49), provision is made for supporting the second section B as this section is withdrawn from its supports on the machine, or the machine supports withdrawn from the section; again, for example, the section to be removed may be slung to a crane. The hand wheel 61 is then rotated to unscrew the bar 58 from the plug 22 of the section B, preferably the bar 58 is slid (to the left in Fig. 2) to draw the threaded end of the bar into the tapered pin 57, and then the tapered pin is slid (to the left in Fig. 2) to withdraw this pin and the threaded end of the bar 58 from the recess 65 of the plug 22. Also the cap 50 is lifted to permit the bearing 49 to be lifted from its seat in the frame member 11. The section B (carrying with it the bearing 49) is then moved from between the frame members 10 and 11 in such a direction that the slot or slots 67 permit the plug 22 to pass away from the key or keys 66; for example, the beam sections may be turned to a position where the key or keys 66 are disposed vertically, and then the section B raised from between 10 and 11. The section B also is then conveyed to a convenient place where the empty spools on the beam tube 20 can be replaced by filled spools, as before described. When the two beam sections have been supplied with filled spools, the two sections can be returned to the knitting machine by operations which are the reverse of those described above for taking the two sections away from the machine.

It will be understood that the invention is not

limited to the details of construction and operation described above and shown in the drawings except as appears hereafter in the claims, and that the claims include equivalents of the elements mentioned in them.

I claim:

1. A yarn beam assembly having at least two sections arranged end to end, at least one of which is a thread-carrying section, and a connecting element disposed within one of said two sections and releasably engaging the other of the said two sections to draw the said two sections together longitudinally.

2. The subject matter of claim 1, characterized by the fact that one of said two sections is provided with a tapered centering pin and the other thereof is provided with a recess to receive said pin.

3. The subject matter of claim 1, characterized by the fact that said two sections are provided with an intermeshing connection tending to prevent relative angular motion between the said sections.

4. A yarn beam assembly having at least two sections arranged end to end, one of said two sections being provided with a threaded bore, and a threaded bar within and substantially coaxial with the other of the said two sections and threaded into said bore to releasably draw the said two sections together longitudinally.

5. The subject matter of claim 4, characterized by the fact that one of said two elements is provided with a tapered centering pin surrounding said bar and the other thereof is provided with a recess receiving said pin.

6. The subject matter of claim 5, characterized by the fact that said two sections are provided with an intermeshing connection, displaced from the axis of said bar, tending to prevent relative rotation of the two sections.

7. In a yarn beam assembly, two yarn beam sections arranged substantially end to end, one of said sections being hollow from end to end and the other of said sections being provided with a threaded bore, and a threaded bar disposed within the hollow of the first mentioned section and projecting therefrom and threaded into said bore to draw the said two sections together longitudinally.

8. In a yarn beam assembly, two hollow yarn beam sections arranged end to end, a plug in each end of one of said sections, a bar substantially coaxial with said section, said bar being slidable and rotatable in said plugs and projecting from the end of the said section which is adjacent the other of said two sections, a collar on said bar engageable with one of said plugs to limit the movement of said bar toward said other of the two sections, and a plug in said other of the two sections provided with a threaded bore, the end of said bar which projects from the first mentioned section being threaded into said bore.

9. The subject matter of claim 8, characterized by the fact that one of the two plugs of adjacent ends of the two beam sections is provided with a tapered centering pin and the other is provided with a recess receiving said pin.

10. The subject matter of claim 8, characterized by the fact that the two plugs of adjacent ends of the two beam sections are provided with complementary elements of an intermeshing connection, displaced radially from said bar to tend to prevent relative angular motion between the said two sections.

11. In a yarn beam assembly, a yarn beam pro-

vided with a threaded bore in one end, a support for the opposite end of the beam, a bearing adjacent the first mentioned end of the beam, a rotation-controlling element mounted in said projecting bearing, a tapered centering pin longitudinally slidable within and substantially coaxially of said rotation-controlling element, a threaded bar slidable within said centering pin, a collar on said bar to limit the movement of said bar toward said yarn beam, said bar being threaded into said threaded bore, and complementary elements of an intermeshing connection on said rotation-controlling element and said beam.

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