Dec. 29, 1970 D. ROSENKRANZ ET AL 3,550,231

FLANGED ROLLER

Filed March 21, 1969 2 Sheets-Sheet 1

FIG. 1

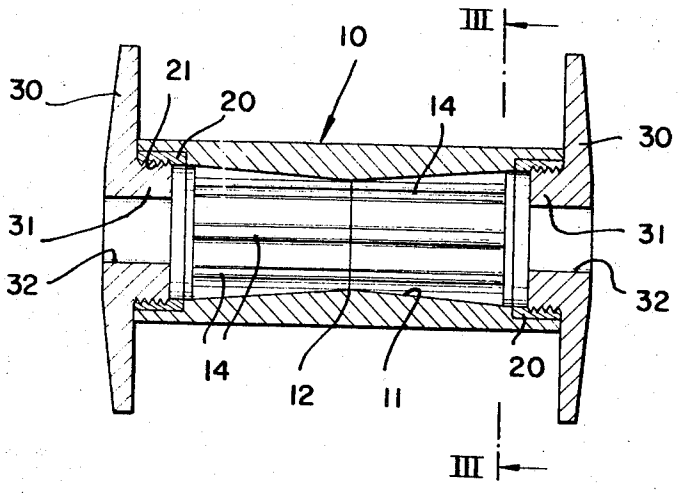


FIG. 2

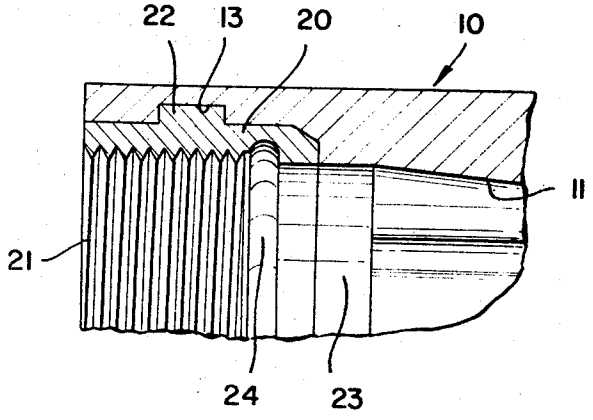
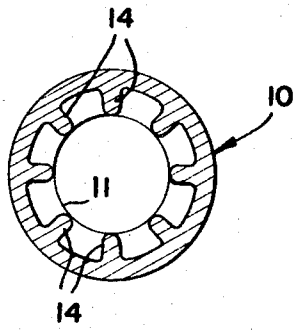


FIG. 3



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Filed March 21, 1969 2 Sheets-Sheet 2

FIG. 4

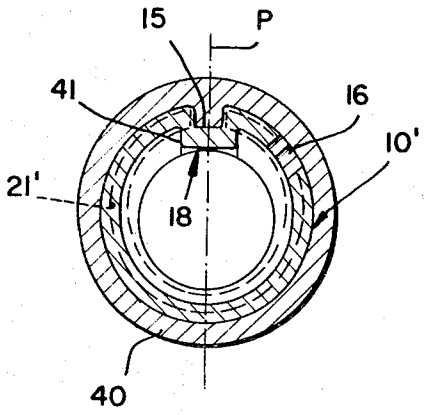


FIG. 5

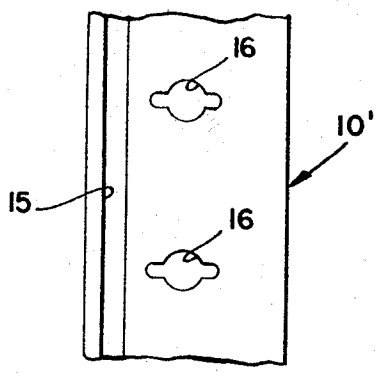


FIG. 6

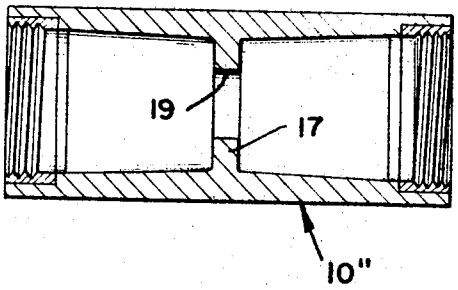
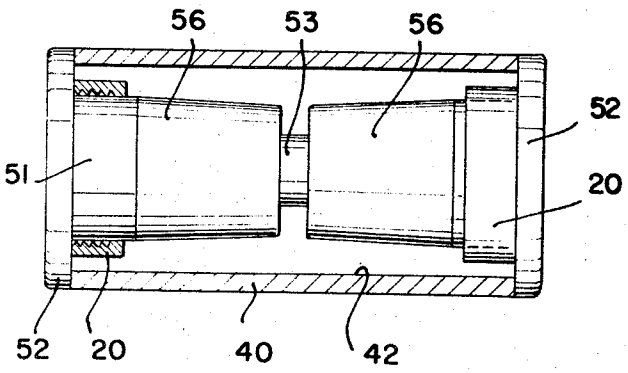


FIG. 7



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FLANGED ROLLER

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Int. Cl. B21b 31/00
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ABSTRACT OF THE DISCLOSURE

A hollow roller member of generally constant outside diameter has a progressively decreasing wall thickness as measured from the longitudinal roll center towards each end thereof. A ring member having externally disposed, radially projecting elements is embedded within the roller body at each end thereof. A roll end flange is secured to each ring.

Our present invention relates to a flanged roller of the type used for the winding of yarns, fabrics or the like, such as the warp booms and take-up booms of looms.

Conventional methods of making the tubular roller bodies by extruding a tube of indefinite length, which is subsequently cut into sections, are not very economical. Since the extrusion process requires a constant wall thickness, the latter must be chosen so as to afford sufficient strength at the point of greatest stress, i.e. at the center, even though lesser wall thicknesses would suffice at the ends of the roller body. Thus, the conventional manufacturing process involves the expenditure of more material (e.g. aluminum) than would be required for structural reasons, this also resulting in an unnecessary increase in the weight of the roller.

The general object of our present invention, therefore, is to provide a roller for the purpose set forth whose wall thickness corresponds more nearly to the expected stress distribution and which therefore may be of a lighter weight than equivalent rollers of the prior art.

A related object is to provide a simple process for serially manufacturing such rollers in an economical manner.

More specifically, our invention aims at providing a convenient method of molding the body of such a roller from suitable casting material (e.g. aluminum or glass-fiber-reinforced synthetic resin) in a manner allowing the attachment of two disks or check plates to that body to form its end flanges.

These objects are realized, pursuant to our present invention, by the casting of a tubular body in an annular space between the inner wall of a cylindrical mold cavity and a pair of generally frustoconical mold cores inserted into the cavity from opposite ends thereof, the casing thus produced having a wall thickness which is greatest at the center and progressively diminishes toward the ends. The technique of low-pressure chill casting is particularly suitable for this process.

In order that the cast tubular body may be conveniently fitted with a pair of end flanges, we prefer to place a pair of internally threaded rings of metal or other suitable material, not necessarily identical with that of the roller body, on the two cores so that these rings become imbedded in the mass of the molded workpiece. Disks with externally threaded bosses can then be screwed onto these ends to form the flanges or cheeks of the roller.

The mold cores and/or the cavity may be grooved, ribbed or otherwise shaped to produce complementary formations on the inner or outer periphery of the roller body, e.g. for purposes of reinforcement or to facilitate the anchoring of the yarn thereto when the roller is to be used as a warp or take-up boom.

The above and other features of our invention will become more fully apparent from the following detailed description given with reference to the accompanying drawing in which:

FIG. 1 is an axial sectional view of a flanged roller made in accordance with our present invention;

FIG. 2 is a fractionary sectional view, drawn to a larger scale, of an end of a slightly modified roller according to our invention;

FIG. 3 is a cross-sectional view taken on the line III—III of FIG. 1;

FIG. 4 is a view similar to FIG. 3, illustrating a further modification of a roller body together with a mold therefor;

FIG. 5 is a fragmentary top view of the roller body shown in FIG. 4;

FIG. 6 is an axial sectional view of another modified roller body according to the invention; and

FIG. 7 shows, in axial section, a mold designed to produce the roller body of FIG. 6.

In FIG. 1 we have shown a tubular roller **10** whose inner peripheral surface **11** has the shape of a double frustocone, the thickness of the body thus decreasing progressively from the center **12** toward the two ends. Imbedded in these ends are a pair of rings **20** bearing internal threads **21** with an inner diameter equal to the largest diameter of the inner wall surface **11**. These threads mate with outer threads on bosses **31** of respective end disks **30** which are of substantially larger diameter than the roller body so as to form a pair of end flanges thereon. The disks **30** are provided with center holes **32** for the passage of a mounting shaft not shown.

Roller body **10** is further provided with an array of peripherally spaced reinforcing ribs **14**, see also FIG. 3, which terminate at the central ridge **12**, being thus spaced from the roller axis by a distance equal to the radius of that ridge.

As illustrated in FIG. 2, the ends of roller body **10** may be recessed at **13** to receive projecting formations **22** of rings **20**, these formations being either continuous (i.e. an annular ridge) or peripherally spaced. Thus, the ring **20** of FIG. 2 is positively interlocked with the roller body **10** molded therearound.

FIG. 2 also illustrates a detail of ring **20** designed to prevent the entry of molding material into the threads **21**. Thus, the ring is shown to have a shoulder **23** flush with the cylindrical terminal portion of the inner roller periphery **11**, this shoulder being separated from the threads **21** by an annular groove **24**.

FIGS. 4 and 5 show a modified roller body **10'** whose peripheral wall is deformed at **18**, in the vicinity of a radial plane P, to form an outer groove **15** extending longitudinally of the roller. This groove is designed to accommodate an anchor bar, not shown, to which a set of warp threads may be fastened and which in turn may be temporarily attached to the roller with the aid of straps hooked into keyholes **16** as is well known per se.

FIG. 4 also illustrates an iron shell **40** to be used as a mold for the chill casting of roller body **10'**, the shell being provided with an inner peripheral rib **41** to define the groove **15**. As indicated in dotted lines in FIG. 4, the end rings **21'** may in this case be formed within a gap accommodating the rib **41**. Naturally, rib **41** would be omitted if the mold were used to cast a roller body without groove **15**, such as the one shown in FIGS. 1–3.

FIG. 6 shows a roller body **10''** which differs from the previously described bodies by having a central partition **17** at the location of its minimum inner diameter.

Although this partition could be made solid so as to split the center bore of the roller body into two separate halves, the embodiment shown in FIG. 6 has this partition formed with an axial aperture **19** whereby the roller can be mounted on a throughgoing shaft. For this purpose, advantageously, the diameter of aperture **19** is equal to that of the center holes **32** (FIG. 1) of disks **30**, thus letting the partition **17** come to rest on the mounting shaft as a supporting web.

Reference will now be made to FIG. 7 for a more detailed description of the manner in which the roller bodies shown in the preceding figures may be produced. The cylindrical mold shell **40**, defining a cavity **42**, is open at its ends to receive a pair of symmetrical frustoconically tapered cores **50**, each with a cylindrical neck **51**, carried on an end plate **52**. The rings **20** have been slipped onto the necks **51** of the respective cores which, in order to produce an internally partitioned roller body of the type shown in FIG. 6, are axially spaced apart and are traversed by a removable central rod **53** defining the aperture **19** of FIG. 6. The rings **20**, particularly if they consist of a material different from that of the mass which is to form the roller body, are advantageously preheated before being slipped onto the cores **50**. The molding material is then admitted at low pressure into the annular space between cavity wall **42** and cores **50** to form the roller body and to fuse with the hot rings **20** into a unitary structure. After chilling and hardening of the molded workpiece, the mold may be opened by removal of the end plates **52** to allow the cast body to be extracted.

If the roller body is to be internally ribbed, as illustrated in FIGS. 1 and 3, the cores **50** will have to be externally grooved as will be readily understood by those skilled in the art. It will also be apparent that projections on these cores, conforming to the keyholes of FIGS. 4 and 5, may be provided on the cores **50** and will be sheared off when the mold is opened.

It will thus be seen that we have provided a method of making roller bodies of various configurations in a single casting step, without the need for subsequent machining to form grooves, holes, or threads for the attachment of cheek plates.

We claim:

1. A roller comprising:

a tubular body having a centrally located, longitudinal bore therethrough;

the bore diameter progressively increasing from the body center toward each end;

the outer diameter of said body being substantially constant whereby the wall thickness of the body is greatest at the center and decreases toward the ends;

a pair of internally threaded rings, each having a plurality of externally disposed radial projections thereon;

one of said rings, including said projections thereon, being embedded at each end of said body and concentric with said bore; and

a pair of disks having each a threaded boss portion matingly engaging one of said rings, said disks forming end flanges for said body.

2. A roller as defined in claim **1** wherein said body is formed with a central transverse partition bisecting said bore.

3. A roller as defined in claim **2** wherein said partition is provided with an axial aperture.

4. A roller as defined in claim **1** wherein said body has an external longitudinal groove.

5. A roller as defined in claim **4** wherein the periphery of said body is inwardly deformed in the vicinity of a radial plane to form said groove.

6. A roller as defined in claim **1** wherein said body is provided with an array of peripherally spaced inner longitudinal ribs.

7. A roller as defined in claim **1** wherein said body is provided with at least one throughgoing radial hole.

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