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AXIALLY COMPRESSIBLE REEL FOR FILAMENTARY COILS

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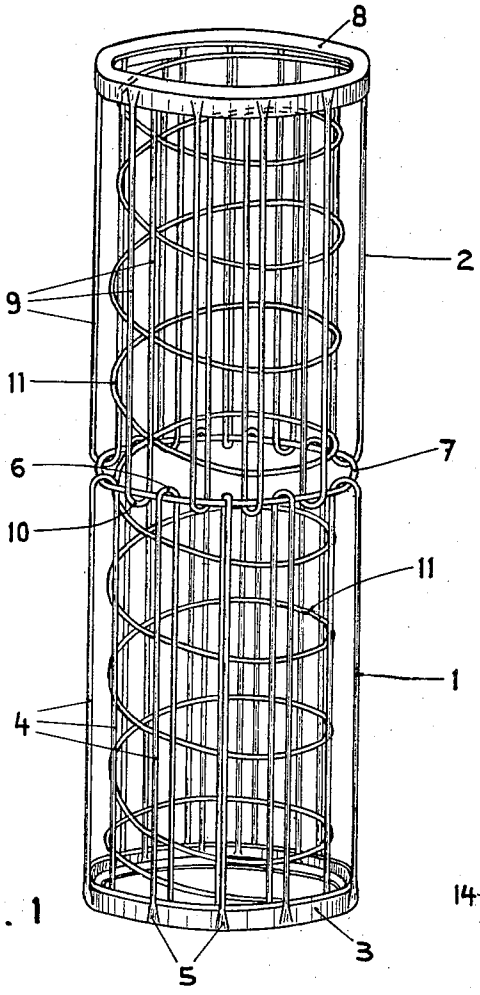


Fig. 1

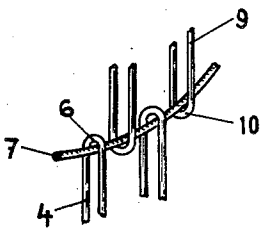


Fig. 2

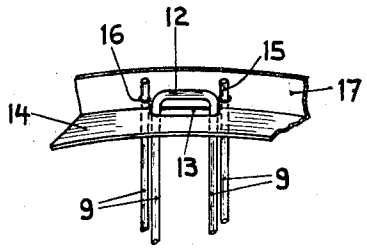


Fig. 3

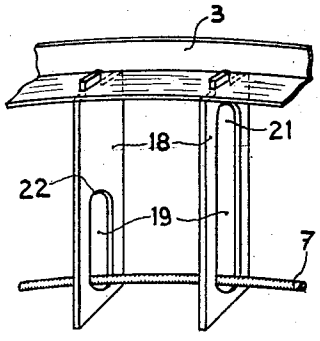


Fig. 4

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AXIALLY COMPRESSIBLE REEL FOR FILAMENTARY COILS

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7 Claims. (Cl. 242—118.11)

The instant invention relates to reels of the shell or cage type, such as used for the wet processing of filamentary material wound in coils thereon in, for example, dyeing.

An object of the invention is to provide a reel or spool of such type which is compressible in its axial direction against a spring.

A further object of the invention is to provide a reel or spool consisting of two axially aligned wire cages which are displaceable relative to each other against the tension of a spring common to both cages.

Still a further object of the invention is to provide a reel consisting of two like, cage-type, structures, which are interlocked by a ring member common to both cages, which ring is slidable against the pressure of a spring common to both cages in guides formed by longitudinal elements of which the outer elements collectively serve as the carrier on which the filamentary material is wound.

I accomplish the foregoing, and other, objects by constructing the reel or spool of two cages, each cage having a plurality of longitudinal carrier elements disposed relative to each other to form a cylinder or cone, one end of each carrier element being affixed to an end ring. Each of the carrier elements permits the passage therethrough of a holding ring which is common to the two cages, the carrier elements of the one cage alternating with those of the other cage on the holding ring. Within the two cages a coiled spring is positioned and pretensioned so that the spring, bearing at its ends against the end rings, respectively, of the cages, extends the reel or spool axially the maximum possible distance as determined by the length of the carrier elements. The carrier elements each are a pair of wires looped about the holding ring with its other ends, as stated, affixed to the end ring, with the wires of each pair aligned with each other substantially radially. In a modified form, two circumferentially adjacent carrier element pairs may be of a single wire. In another modified form, the carrier elements may be a series of radially disposed plates having a longitudinal groove therein, extending lengthwise of the carrier elements, the groove being closed at the holding ring end region thereof and either open or closed at the end ring region thereof. The carrier elements, whether in the form of wires or plates, are of any appropriate metal or plastic of adequate rigidity.

The reel or spool of the instant invention will more readily be understood from the description of illustrative embodiments thereof in conjunction with the accompanying drawing in which:

Figure 1 is a perspective view of the reel or spool of my invention having wire carrier elements;

Figure 2 is a detail, on an enlarged scale as compared to Figure 1, of the interengagement of the wire carrier elements of both cages with the holding ring common to both cages;

Figure 3 is a detail, likewise on an enlarged scale, of the modification employing wire elements in which two successive carrier elements are made from a single wire; and

Figure 4 is a detail, likewise on an enlarged scale, of the modification employing radial plates as the carrier elements.

Referring to the illustrative embodiment of Figures 1 and 2, the reel consists of the two axially aligned cages 1 and 2, cage 1 having an end ring 3 from which extends a plurality of circumferentially spaced carrier elements 4 perpendicular to the plane of ring 3. Each of the carrier elements 4 is a wire loop, of hairpin shape, having its free ends 5 affixed to the ring 3, for example, by welding, in such manner that the two relatively long legs thereof are in substantially a radial plane and its loop 6 passes over a loose holding ring 7 which is threaded through all of the plurality of carrier elements 4. The other cage 2 similarly comprises an end ring 8 from which extends, perpendicular to the plane of end ring 8, a plurality of circumferentially spaced carrier elements 9, likewise in the form of hairpin loops of which the straight ends are affixed to the end ring 8. The loops 10 of carrier elements 9 pass radially over the holding ring 7 but in the opposite direction from that of the loops 6 of the carrier elements 4 of cage 1. The holding ring 7 is thus threaded through both pluralities of carrier elements and rests freely movable axially in the loops thereof.

A coiled spring 11 is disposed within both of the cages forming the reel or spool and is braced at its one end against the end ring 3 and with its other end against end ring 8, and is pretensioned so that the cages are in the position of maximum possible axial displacement shown in Figure 1 in the normal condition, that is, in the absence of an external compressing force applied to the free ends of the cages.

In the illustrative embodiment of Figure 1, each of the carrier elements 4 and 9 is made of a separate wire bent into hairpin shape. In the detail shown in Figure 3, two circumferentially successive carrier elements of each cage are made from a single wire. The two carrier elements, for example 9 of cage 2, are formed, commencing with a wire end 15 by measuring off a leg 9, then bending the wire successively radially to form a loop 10, then circumferentially to form a loop 12, and then again radially to form a second loop 10, extending in the same direction as the first loop 10, each loop having between it and the succeeding loop a leg 9, and the wire cut after measuring off a leg 9. In this modification the end ring, referenced 14 but which is actually either end ring 3 or 8, has a circumferential slit 13 to receive the loop 12 interconnecting the two carrier elements made from one wire, and a pair of apertures spaced radially outwardly from the slit 13 and substantially radially aligned with the ends of slit 13 to receive the offset outer legs 9 of the pair of carrier elements.

In the further modification of the illustrative embodiment of which a detail is shown in Figure 4, the carrier elements 4 and 9, are in the form of relatively thin and narrow plates 18 in spaced radial planes having a groove 19 extending lengthwise of the respective cages, so that the end of the plates 18 remote from the respective end rings is adapted, under the pressure of the spring 11, to engage the holding ring 7 and permit the holding ring to slide therein on compression of the spring. The end of the groove 19 the nearer to the plate end attached to an end ring may be open 21, or closed 22, as may be selected. It is to be noted that to obtain a compression axially of the reel to one-half its original axial length, that is, to the height of one cage, the grooves 19 need extend but half the length of the carrier elements from the position of the holding ring 7 with the reel in its normal condition, as shown in the thin element to the right in Figure 4. Preferably in manufacturing the carrier elements in the form of such radial plates, the grooves 19 are formed by stamping out the plates.

The axial length of the spring 11, when untensioned,

exceeds the sum of the axial lengths of both cages and hence, in the normal position of the cages, the spring is somewhat pretensioned, the pretension being applied to the holding ring. The cages are relatively displaced into each other, and in so doing the carrier elements of each cage move in the space between circumferentially adjacent carrier elements of the other cage with the holding ring axially guiding both cages. On removal of the external pressure the cages return to their original and normal position.

In the illustrative embodiment of Figure 1, each end ring and the holding ring are essentially of the same diameter, resulting in a substantially cylindrical reel. By making the diameters of the holding ring a given amount smaller than that of the end ring of one cage, and that of the end ring of the other cage (having carrier elements of the same length, for example) smaller by twice the given amount than the end ring diameter of the one cage, a reel in the shape of a conical frustum is obtained, of which the conical surface of each cage is the smooth continuation of that of the other cage. To prevent binding of the holding ring on relative displacement of the carrier elements of the respective cages and the holding ring when axially compressing the conical reel, obviously the radial spacing of the carrier elements of a pair must be made adequate depending on such given amount of diameter decrease, and may be greater than in a corresponding cylindrical reel. The conical reel has the advantage over the cylindrical reel that, to remove the coil wound thereon, the former can readily be forced out of the coil and replaced by another, for example, of cardboard. Thus the conical reel saves a rewinding of the coiled material, for with a cylindrical reel rewinding of the coil is required for further handling or processing of the coiled thread.

The embodiments above described are by way of illustration only and not in any manner by way of limitation of the principles of my invention of which the practical embodiments permit of various modifications without departing from the spirit and scope thereof.

What I claim is:

1. A reel for wet processing coils of filamentary material and the like wound thereon, comprising a pair of cages, each cage consisting of an end ring, a plurality of spaced, relatively long, thin elements, extending substantially perpendicularly to the plane of the end ring in one direction from the end ring, the thin elements being arranged in substantially radially aligned spaced pairs, and a radial interconnection between the ends remote from the end ring of the thin elements of a pair, a wire holding ring threaded through each radial pair of the plurality of thin elements of both cages and freely movable axially between the elements of the pairs, the thin element pairs of the plurality of the one cage being interlaced with the thin element pairs of the plurality of the other cage, and a totally unattached coil spring braced with its ends against the respective end rings of the cages within the reel and pretensioned to engage the interconnections with the holding ring.

2. A reel according to claim 1 in which each radial pair of thin elements is integral with the interconnection thereof, and is of a single wire of hairpin shape of which the loop passes around the holding ring.

3. A reel according to claim 1 in which two circumferentially successive radial pairs and the interconnections of each pair are integral and made of a single wire with the radially innermost carrier elements connected by a loop extending circumferentially of the end ring, and the end ring is provided with a circumferential aperture into which the circumferentially extending loop is inserted.

4. A reel according to claim 3 in which the end ring is provided with a pair of small apertures radially outward from and aligned with the ends of the circumferentially extending aperture into which small apertures the ends of the outermost carrier elements of the two circumferentially successive pairs are inserted.

5. A reel according to claim 1 in which the diameter of the wire of the loose holding ring is substantially less than the radial distance between an aligned pair of thin elments.

6. A reel for wet processing of filamentary material and the like wound thereon comprising a pair of axially aligned cages, a spring against the tension of which the cages are movable axially relative to each other, each cage comprising a plurality of longitudinal carrier elements collectively defining a cylindrical surface, and an end ring in which one end of each element of the plurality is mounted, the remaining portions of each element forming an elongated, axial passage, and a holding ring common to both cages successively threaded through the passage of one cage and the adjacent passage of the other cage to join the cages to each other and to permit relative axial movement of the cages.

7. A reel for wet processing coils of filamentary material wound thereon, comprising a pair of cages, each cage consisting of an end ring, a plurality of spaced, relatively long, carrier elements, each element having one end supported in the end ring and having its remaining portion formed into an elongated passage parallel to the length dimension of the element, a wire ring threaded alternately through the passages of the one cage and those of the other cage, and a freely movable spring within the reel braced with its ends against the end rings of the respective cages and pretensioned to expand the reel to its maximum axial length.

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