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A WEB-SPOOL FOR A CARTRIDGE

BACKGROUND OF THE INVENTION

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Field of the Invention

10 The present invention relates generally to spools, and more particularly to a web-spool for a cartridge or the like.

Description of the Prior art

15 It is known in the minilab printer art to provide long rolls of photographic paper, and in the computer output microfilmer art to provide long rolls of 16mm or 105mm photographic film, each in convenient daylight-loading cartridges. Those cartridges generally comprise a cylindrical core onto which the film or
20 paper is wound to form a web-roll. The web-roll is enclosed within the cartridge and rotatably supported by sidewalls thereof. The cartridge is provided with a web exit slot having opposed surfaces to which a plush or foam material is applied to allow the web to be
25 withdrawn from the cartridge while excluding light from the cartridge interior. Typically, an anti-clockspringing bar to prevent rotation of the core during shipment is installed through holes in a cartridge rim surrounding the core end, and through one
30 of a plurality of aligned castellations on the core end.

As a need has developed for greater web widths and longer web lengths, a problem has arisen in which the web-roll within the cartridge dishes or telescopes axially as a result of shock and vibration during
35 shipment of packaged cartridges. When a web-roll dishes or telescopes, portions of the faces of the web-roll may rub against the interior side surfaces of

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the cartridge, resulting in an unacceptably high web withdrawal force. A further problem is breakage of the cartridge, core, or anti-clockspringing bar as a result of the high rotational, inertial forces caused by the longer, wider, and heavier web-rolls.

The aforementioned problems may be solved in part by attaching a pair of flanges to opposite ends of the cartridge core to constrain a roll wound on the core from dishing or telescoping into contact with the interior walls of the cartridge. With such a web-spool, the anti-clockspringing mechanism can be mounted on the cartridge, as shown in U.S. Patent No. 4,802,633, to engage the periphery of the flange instead of the cartridge core.

Tape- or film-spools are also well known in the art, as indicated in the above-mentioned U.S. Patent No. 3,438,592 and No. 4,802,633. The film spool comprises three distinct elements, namely, two flanges and a cylindrical core, which are rendered integral by assembly. In U.S. Patent No. 3,438,592, the core has annular throats into which project circular sectors separated by core notches provided for passage of lugs on the flanges. One disadvantage of that type of film-spool is that it would be extremely difficult to accurately wind the film onto the core prior to mounting the flanges on the core. The slightest axial telescoping movement of the film as it is wound would make it extremely difficult, if not impossible, to attach the flanges onto the ends of the core. That problem is overcome in the present invention by providing radially outwardly extending tapered guide rings facing each other at the ends of the core for initially guiding the web onto the core and to provide clearance between the web edges and the flanges. The clearance accommodates web telescoping so that the flanges can be secured to the core ends without any interference or resistance from the web edges resulting from any axial telescoping of the roll that occurs during winding.

SUMMARY OF THE INVENTION

5 An object of the present invention is to provide an improved web-spool for a cartridge or the like. The web-spool comprises a cylindrical core having, at each end thereof, at least one axially outer core lug extending radially outward from the core periphery and
10 one axially inner core ring also extending radially outward from the core periphery, the core ring being disposed parallel with and spaced axially inward from each core lug to form a core peripheral groove therebetween. A pair of flanges are attachable to the
15 core ends. Each flange has a throat extending from an axially inner surface thereof toward an axially outer surface thereof for receiving the core lug(s) and the core ring on a complementary core end. Each flange throat further has at least one radially inwardly
20 extending flange lug and a pair of recesses adjacent to respective opposite sides of each flange lug. The flange lug(s) nests within the core peripheral groove, while the recesses on opposite sides thereof receive the core lug(s) and the core ring respectively, when
25 the complementary core end is inserted into the flange throat. The core and mated flange are then rotated relative to each other to secure the two together.

 There are several advantages of the web-spool of this invention. The design of the core and flanges is
30 such as to allow assembly of the flanges to the core after the web has been spooled onto the core. Also, an anti-clockspringing mechanism can be mounted on the web-spool cartridge for engagement with a flange periphery rather than the core. This provides a
35 significant torque advantage which reduces the forces on the plastic core and any possible shipping and handling damage to the cartridge. With this web-spool, the spool bearing diameter can be reduced below the



core diameter for reducing the normal core bearing frictional torque, thus reducing the web withdrawal forces.

- 5 This invention, and its objects and advantages, will become more apparent from the detailed description of the preferred embodiment presented below.

BRIEF DESCRIPTION OF THE DRAWINGS

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In the detailed description of the preferred embodiment of this invention presented below, reference is made to the accompanying drawings, in which:

- 15 Fig. 1 is a perspective view of a cartridge in which a preferred embodiment of the web-spool of this invention is embodied;

- Fig. 2 is a perspective view of the cartridge of
20 Fig. 1 with one housing thereof removed to expose a web wound on a web-spool;

- Fig. 3 is a perspective view of the web-spool of this invention comprising a core having ends to which
25 flanges are attached;

Fig. 4 is an enlarged perspective view of the core;

- Fig. 5 is a segmental front elevational view of the
30 center portion of the inner surface of the flange;

Fig. 6 is an enlarged segmental sectional view taken substantially along line 6-6 of Fig. 3;

- 35 Fig. 7 is a segmental front elevational view of the center portion of the outer surface of the flange; and





Fig. 8 is an enlarged segmental sectional view taken substantially along line 8-8 of Fig. 3.

5 DESCRIPTION OF THE PREFERRED EMBODIMENT

Because certain parts of web-spools and cartridges are well known, the following description is directed in particular to those elements forming, cooperating
10 directly with, or relating to the present invention. Elements not specifically shown or described herein are selectable from those known in the pertinent art.

Illustrated in Figs. 1 and 2 is a cartridge 10 suitable for supplying a computer-output microfilmer or
15 the like with a long web 8 of 16mm- or 105mm-wide film. The cartridge 10 typically comprises a pair of cartridge housings 12, 14 having sidewalls 16, 18, only two of which are shown in detail, provided with matching semicircular journals 20, 22 for rotatably
20 supporting cylindrical bearings 24 on a pair of identical flanges 26 of a web-roll 32. The cartridge housings 12, 14 are sealed together along mating rims 28, 30 for enclosing the web-roll 32. Housings 12, 14 have nose portions 34, 36 with opposed inner surfaces
25 defining an exit slot 38 through which the web is withdrawn from the cartridge. The opposed inner surfaces normally have a plush or foam material applied thereto, not shown, to prevent light from entering the cartridge interior.

30 With reference to Figs. 3 and 4, a web-roll of the general type illustrated in Fig. 2 comprises a web-spool 40, onto which a long web 42 (Fig. 8) of film or paper is wound. The web-spool 40 comprises a cylindrical core 44, as best seen in Fig. 4, having
35 opposed ends to which a pair of flanges 46, similar to the flanges 26 of Fig. 2, are attached or secured. To manufacture the cartridge, some of the steps involve initially winding the web onto the core 44, attaching the flanges 46 to the core ends to form a web-roll,

placing the web-roll in one of the cartridge housings, and securing the other cartridge housing to the one housing for enclosing the web-roll.

5 Referring to Figs. 4-8, means for securing the identical pair of flanges 46 to the identical core ends will now be described. Each core end has a plurality of core lugs 48 radially extending outwardly from the periphery thereof. The core lugs 48 are spaced apart,
10 providing notches 50 therebetween. Axially spaced from the core lugs and parallel thereto is an annular core ring 52 radially extending outwardly from the core periphery. A core groove 54 (Fig. 8) is formed between the core lugs 48 and core ring 52. The ring inner
15 surface 56 is tapered to facilitate winding the web 42 on the core 44 with sufficient clearance, in regard to axial web movement during winding, so that the flanges 46 can be attached to the core ends following the winding operation, without any difficulty. The
20 radially outermost peripheral edge 58 of the tapered surface 56 (Fig. 8) lies in the plane B-B of the flange inner surface. The radially innermost edge 60 of the tapered surface 56 merges with the core outer periphery. The axial distance between the outermost
25 peripheral edges 58 of the tapered surfaces 56 on the two flanges 46 is greater than the axial distance between their innermost peripheral edges 60, to allow limited axial movement of the web during winding without impairing attachment of the flanges 46 onto the
30 core ends after the winding operation is completed.

Each flange 46 (Fig. 3) has an outer surface provided with a cylindrical bearing 62. Each flange 46 further has an annular throat 64 extending from its inner surface toward its outer surface, as best seen in
35 Figs. 5 and 8. The throat 64 has a plurality of radially inwardly extending flange lugs 66 spaced apart to form notches 68 therebetween. Recesses 70 and 71 are provided adjacent to opposite sides of the flange lugs 66.



To secure a flange 46 to a core end, the two are aligned and moved together with the core lugs 48 passing through the flange notches 68 and the flange lugs 66 passing through the core notches 50 until the ring 52 engages the flange lugs 66 and the flange lugs 66 nest in the core groove 54. Relative rotational movement is imparted to the core 44 and flange 46, causing the core lugs 48 to move behind the flange lugs 66 to prevent axial removal of the flange 46 from the core end. Stop shoulders 72 are provided at one of the ends of the flange lugs 66 (Fig. 7), which are engageable by one of the ends of the core lugs 48 for stopping relative rotational movement of the core and flange when the two are secured together.

To assist in attaching the flanges 46 to the core ends, each flange is provided with an annular guide rim 74 that engages the inner periphery 76 of the core 44 and guides the core lugs 48 into alignment with the flange notches 68 upon rotational adjustment of the core or flange.

With reference to Figs. 4-6 and 8, ratchet teeth 55 on the core and ratchet teeth 78 on the flange are interposed between the core 44 and flange 46 to allow relative rotational movement of the core and flange for securing the two together, but preventing rotational movement in the opposite direction for disassembling the two. Preferably, the teeth 55 are arranged on an inner peripheral surface 76 of the core 44 (Fig. 4) for engaging the complementary teeth 78 on an outer peripheral surface 80 of the guide rim 74. The teeth 55 need not be continuous around the inner periphery 76 of the core, and preferably are arranged in angular spaced sectors. The teeth are inclined in the proper direction, as best seen in Fig. 6, to allow rotational movement of the flange 46 and core 44 in a direction to secure the two together, but to prevent rotational movement of the flange and core in a direction that would disassemble the two.



To facilitate movement between the core and flange,
the core and flange lugs 48 and 66 respectively are
provided with rounded or tapered leading and trailing
5 ends.

This invention has been described in detail with
particular reference to a preferred embodiment thereof,
but it will be understood that variations and
modifications can be effected within the scope of this
10 invention as defined by the following claims.

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PATENT- UND RECHTSANWALTE



91 908 067.1-2205

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Our Ref.: EP-67 722

January 25, 1995

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New claims

1. A web-spool (40) comprising:

- a cylindrical core (44) having a cylindrical outer peripheral surface onto which a web (42) is wound, the core (44) having at each end thereof at least one core lug (48);
 - a flange (46) releasably secured to each core end, each flange having an axially inner and outer surface perpendicular to said cylindrical outer peripheral surface, said inner surface facing a corresponding edge of the wound web, and being provided with a flange lug (66); said flange lug (66) being adapted, upon rotation of the flange relative to the core, to lockingly engage a core lug (48), to releasably secure said flange to said core end;
- characterized in that: said cylindrical core (44) further comprises at each end a core ring (52), said core ring (52) and said core lug (48) both extend radially outwardly away from said cylindrical peripheral surface, substantially perpendicularly thereto and in parallel spaced relation to each other, to form a peripheral groove (54) therebetween at each core end; said core ring (52) has a predetermined shape and is placed at a predetermined location on said cylindrical peripheral surface so as to guide the web (42) when it is wound onto the core; each flange (46) is provided with a flange throat (64) extending from the inner surface of the flange toward the outer sur-



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face of said flange for receiving therein said core lug (48) and said core ring (52), said flange lug (66) extends radially inwardly in said flange throat (64) so as to form a recess (70, 71) axially outwardly adjacent the flange lug (66), said flange lug (66) being adapted to nest within said peripheral core groove (54), said recess (70, 71) being adapted for receiving said core lug (48) and said core ring (52) respectively when said core end is inserted into said flange throat (64).

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characterized in that

2. A web-spool as claimed in Claim 1 ~~wherein~~ each core ring (52) has an inner tapered surface (56), so that said tapered surface (56) on said core ring (52) at one core end faces said tapered surface (56) on said core ring (52) at the other core end; wherein said inner surface on each flange (46) lies substantially in a plane (B-B), and said tapered surface (56) on each core ring (52) has a radially outermost peripheral edge (58) adapted to lie substantially in said plane (B-B); wherein said tapered surface (56) on each core ring (52) has a radially innermost peripheral edge (60) that merges with said core peripheral surface; and wherein the distance between said outermost peripheral edge (58) of said tapered surface (56) on said core ring (52) at said one core end and said outermost peripheral edge (58) of said tapered surface (56) on said core ring (52) at said other core end is greater than the distance between said innermost peripheral edge (60) of said tapered surface (56) on said core ring (52) at said one core end and said innermost peripheral edge (60) of said tapered surface (56) on said core ring (52) at said other core end.

1 or 2 characterized in that

25. 3. A web-spool as claimed in Claim 1 ~~wherein~~ complementary ratchet teeth (55 and 78) are provided on opposed surfaces (76 and 80) of said core (44) end and said flange (46), to allow rotational movement of said core (44) and said flange (46) in a direction securing them (44 and 46) together, but to prevent rotational movement of said core (44) and said flange (46) in an opposite direction that would disassemble them (44 and 46).

characterized in that

35 4. A web-spool as claimed in Claim 3 ~~wherein~~ said complementary ratchet teeth (55 and 78) comprise first and second sets of teeth (55 and 78) on said opposed surfaces (76 and 80) of said core (44) end and said flange (46) respectively.



characterized in that

5. A web-spool as claimed in Claim 4 ~~wherein~~/said
core (44) end has an inner peripheral surface (76);
5 wherein said flange (46) has a guide rim (74) with an
outer peripheral surface (80) for guiding said core
(44) end into said flange throat (64); wherein said
first set of teeth (55) is on said core (44) end inner
peripheral surface (76); and wherein said second set of
10 teeth (78) is on said guide rim (74) outer peripheral
surface (80).

characterized in that

6. A web-spool as claimed in Claim 2 ~~wherein~~/
complementary ratchet teeth (55 and 78) are provided on
15 opposed surfaces (76 and 80) of said core (44) end and
said flange (46), to allow rotational movement of said
core (44) and said flange (46) in a direction securing
them (44 and 46) together, but to prevent rotational
movement of said core (44) and said flange (46) in an
20 opposite direction that would disassemble them (44 and
46).

characterized in that

7. A web-spool as claimed in Claim 6 ~~wherein~~/said
complementary ratchet teeth (55 and 78) comprise first
25 and second sets of teeth (55 and 78) on said opposed
surfaces (76 and 80) of said core (44) end and said
flange (46) respectively.

characterized in that

8. A web-spool as claimed in Claim 7 ~~wherein~~/said
30 core (44) end has an inner peripheral surface (76);
wherein said flange (46) has a guide rim (74) with an
outer peripheral surface (80) for guiding said core
(44) end into said flange throat (64); wherein said
first set of teeth (55) is on said core (44) end inner
35 peripheral surface (76); and wherein said second set of
teeth (78) is on said guide rim (74) outer peripheral
surface (80).

