A pool cover assembly for covering a swimming pool includes a cover, a pool cover box, and a reel positionable within the pool cover box and configured for carrying the cover. The reel includes a tube and an end piece. The tube includes an end with at least one keying feature and the end piece includes at least one mating keying feature. The keying feature and the mating keying feature coact to allow relative axial movement between the tube and the end piece, but not allow relative rotational movement between the tube and the end piece.
REEL FOR AN AUTOMATIC POOL COVER ASSEMBLY

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention
[0002] The present invention relates to swimming pools, and, more particularly, to automatic pool cover assemblies for swimming pools.
[0003] 2. Description of the Related Art
[0004] Swimming pools are commonly covered to prevent debris from entering the pool, to preserve chemical treatments in the water and to heat the pool in the case of a solar cover. An automatic pool cover provides convenience for a user by allowing the cover to be easily extended over the pool during periods of non-use, and retracted during periods of use. Typically, a pool cover box is placed in or on the decking surrounding the swimming pool at a location opposite from the walk-in steps (i.e., usually located at the deep end of the pool). The pool cover box extends across the width of the swimming pool, and within the box is mounted a reel to store the pool cover on, an electric (or hydraulic) motor and a mechanism to deploy and retract the pool cover.
[0005] A problem with a conventional automatic pool cover assembly is that the reel can be somewhat difficult to assemble on-site and/or modify in the event of a design change in the pool. A reel typically has a hollow tube which is cut to a specific length, based upon the expected width of the pool. A tube ring has an outside diameter which fits within the inside diameter of the tube. The tube is then screwed to the tube ring using radially extending metal screws. An end cap or end casting is then fastened to the tube ring, with the end cap having an integral stub shaft extending therefrom for use as either a drive shaft or idler shaft. Alternatively, an end cap may be configured with an outside diameter which fits directly within the tube, without the use of tube ring. The tube is again rigidly affixed to the end cap using screws or the like. These relatively complex mounting arrangements take time to assemble, are a relatively complex mounting arrangements, and do not allow easy retrofit modifications.
[0006] What is needed in the art is a pool cover assembly with a reel which is easy to assemble, disassemble, retrofit and rework.

SUMMARY OF THE INVENTION

[0007] The present invention provides a reel for a pool cover assembly with a tube and at least one end piece which are axially movable but rotationally immovable relative to each other.
[0008] The invention in one form is directed to a swimming pool, including a plurality of side walls and a pool cover assembly for covering the swimming pool. The pool cover assembly includes a cover, a pool cover box mounted along at least one of the side walls, and a reel positioned within the pool cover box and carrying the cover. The reel includes a tube and a drive end piece. The tube includes a drive end with at least one keying feature, and the drive end piece includes at least one mating keying feature. The keying feature and the mating keying feature coact to allow relative axial movement between the tube and the drive end piece, but not allow relative rotational movement between the tube and the drive end piece.
[0009] The invention in another form is directed to a pool cover assembly for covering a swimming pool. The pool cover assembly includes a cover, a pool cover box, and a reel positionable within the pool cover box and configured for carrying the cover. The reel includes a tube and an end piece. The tube includes an end with at least one keying feature and the end piece includes at least one mating keying feature. The keying feature and the mating keying feature coact to allow relative axial movement between the tube and the end piece, but not allow relative rotational movement between the tube and the end piece.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention will be better understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:
[0012] FIG. 1 is a perspective view of a swimming pool including an embodiment of a pool cover assembly of the present invention;
[0013] FIG. 2 is a perspective, partially fragmentary view of an embodiment of a reel of the present invention;
[0014] FIG. 3 is a perspective, partially fragmentary view of another embodiment of a reel of the present invention;
[0015] FIG. 4 is a perspective, partially fragmentary view of another embodiment of a reel of the present invention;
[0016] FIG. 5 is a perspective, partially fragmentary view of another embodiment of a reel of the present invention;
[0017] FIG. 6 is a perspective, partially fragmentary view of another embodiment of a reel of the present invention;
[0018] FIG. 7 is a perspective view of another embodiment of an end piece used with a reel of the present invention.

[0019] Corresponding reference characters indicate corresponding parts throughout the several views. The exemplifications set out herein illustrate a preferred embodiment of the invention, in one form, and such exemplifications are not to be construed as limiting the scope of the invention in any manner.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Referring now to the drawings, and more particularly to FIG. 1, there is shown an embodiment of a swimming pool 10 including a deck 12, a coping 14, a cover 16, a leading edge bar 18 and a pool cover box 20 of the present invention.
[0021] Deck 12 is generally horizontal and is preferably constructed from concrete. Coping 14 connects to deck 12 in a substantially coplanar fashion along the edge of deck 12 facing the interior of swimming pool 10.
[0022] Coping 14 is connected to deck 12 and provides a track allowing leading edge bar 18 to slide therein. The general shape of the exposed portion of coping 14 is generally curved such that there are no exposed sharp corners.
[0023] Cover 16 is attached to leading edge bar 18 which pulls cover 16 from pool cover box 20 through an opening existing between pool cover box 20 and a top edge of swim-
Leading edge bar 18 is connected to cover 16 and provides support along the leading edge of cover 16. Each end of leading edge bar 18 is connected to at least one cable or rope (not shown) and is slidably connected to a track in coping 14. Leading edge bar 18 is shaped in a manner to be unobtrusive and aesthetically pleasing when located at either end of swimming pool 10. Although coping 14 is shown as including an integral track for leading edge bar 18 and cover 16, it is also possible that a pair of top mounted tracks may be mounted to deck 12 along either side of swimming pool 10.

Pool cover 16, leading edge bar 18 and pool cover box 20 form part of a pool cover assembly 22, which also includes a reel 24 (FIG. 2) carried within pool cover box 20. Pool cover assembly 22 also includes a drive mechanism (not shown) housed within pool cover box 20, which typically drives a rope and pulley system for the extension and retraction of cover 16. When cover 16 is retracted from swimming pool 10, cover 16 is wrapped around reel 24 a number of times corresponding to the length of swimming pool 10.

Now additionally referring to FIG. 2, reel 24 will be described in greater detail. Reel 24 is positioned within pool cover box 20 and carries cover 16. Reel 24 includes a tube 26, a drive end piece 28, and an idler end piece 30. Drive end piece 28 and idler end piece 30 each include an axially extending shaft 31, which is either a drive shaft or idler shaft, respectively.

Tube 26 includes a drive end 32 and idler end 34, each of which are substantially identically configured in the illustrated embodiment. Drive end 32 and idler end 34 each include one or more keying features 36. Similarly, drive end piece 28 and idler end piece 30 each include one or more mating keying features 38. Keying features 36 and mating keying features 38 exist to allow relative movement between tube 26 and end piece 28 or 30, but not allow relative rotational movement between tube 26 and end piece 28 or 30. Although each of drive end 32 and idler end 34 are shown as including mating keying features, it is also to be understood that only one of drive end 32 and idler end 34 may include mating keying features.

In the embodiment of reel 24 shown in FIG. 2, keying features 36 are in the form of three tubes which are affixed to the inside diameter of tube 26 and extruded concurrent with tube 26. Similarly, mating keying features 38 are in the form of three tubes or cylinders which extend axially from a corresponding end piece 28 or 30. Tubes 38 are sized, oriented and positioned relative to each other in such that they fit within tubes 36 within tube 26.

Although reel 24 is shown as including keying features 36 in the form of recesses and mating keying features 38 in the form of projections, it is also to be understood that this configuration may be reversed or mixed. That is, keying features 36 may be in the form of projections and mating keying features 38 may be in the form of recesses, or another combination thereof.

During assembly on-site, tube 26 is simply cut to length (if necessary), and each end piece 28 and 30 is assembled to tube 26 by inserting mating keying features 38 into keying features 36. Depending on the exact width of the pool, the axial length of reel 24 may be adjusted through the axial adjustment between keying features 38 into keying features 36.

FIG. 7 illustrates another example of an end piece 90 of the present invention. End piece 90 includes three projections 92 defining mating keying features which can mate, e.g., with keying features 36 (FIG. 2) or keying features 76 (FIG. 5).
What is claimed is:
1. A swimming pool, comprising:
   a plurality of side walls; and
   a pool cover assembly for covering the swimming pool,
   said pool cover assembly including:
   a cover;
   a pool cover box mounted along at least one of said side
   walls; and
   a reel positioned within said pool cover box and carrying
   said cover, said reel including a tube and an end piece,
   said tube including an end with at least one keying
   feature and said end piece including at least one mating
   keying feature, said keying feature and said mating
   keying feature coacting to allow relative axial
   movement between said tube and said end piece, but
   not allow relative rotational movement between said
   tube and said end piece.
2. The swimming pool of claim 1, wherein said end piece is
   a drive end piece, and further including an idler end piece,
   said tube including an idler with at least one keying
   feature and said idler end piece including at least one mating
   keying feature, said keying feature of said idler end and said
   mating keying feature of said idler end with at least one keying
   feature coacting to allow relative axial movement between said tube and said idler end piece,
   but not allow relative rotational movement between said tube and said idler end piece.
3. The swimming pool of claim 1, wherein said at least one keying
   feature in each of said drive end and said idler end are
   a plurality of recesses, and said at least one mating keying
   feature on each of said drive end piece and said idler end piece
   are a plurality of mating projections.
4. The swimming pool of claim 3, wherein said plurality of recesses
   have a cross section with one of a circular, rectangular
   and square shape, and said plurality of projections have
   a mating cross section with one of a circular, rectangular and
   square shape.
5. The swimming pool of claim 1, wherein each said keying
   feature is one of a recess and a projection, and each said
   mating keying feature is one of a mating recess and mating
   projection.
6. The swimming pool of claim 1, wherein each said keying
   feature is a recess, and each said mating keying feature is a mating
   projection.
7. The swimming pool of claim 6, wherein each said recess
   and each said mating projection have a cross section with one
   of a circular, rectangular and square shape.
8. A pool cover assembly for covering a swimming pool,
   said pool cover assembly including:
   a cover;
   a pool cover box; and
   a reel positionable within said pool cover box and config-
   ured for carrying said cover, said reel including a tube
   and an end piece, said tube including an end with at least
   one keying feature and said end piece including at least
   one mating keying feature, said keying feature and said
   mating keying feature coacting to allow relative axial
   movement between said tube and said end piece, but not
   allow relative rotational movement between said tube
   and said end piece.
9. The pool cover assembly of claim 8, wherein said end of
   said tube is one of a drive end and an idler end, and said end
   piece is one of a drive end piece and an idler end piece.
10. The pool cover assembly of claim 8, wherein said at least
    one keying feature is a plurality of recesses, and said at
    least one mating keying feature is a plurality of mating
    projections.
11. The pool cover assembly of claim 10, wherein said plurality
    of recesses have a cross section with one of a circular,
    rectangular and square shape, and said plurality of pro-
    jections have a mating cross section with one of a circular,
    rectangular and square shape.
12. The pool cover assembly of claim 8, wherein each said
    keying feature is one of a recess and a projection, and each
    said mating keying feature is one of a mating recess and
    mating projection.
13. The pool cover assembly of claim 8, wherein each said
    keying feature is a recess, and each said mating keying feature
    is a mating projection.
14. The pool cover assembly of claim 13, wherein each said
    recess and each said mating projection have a cross section
    with one of a circular, rectangular and square shape.
15. A reel for use with a pool cover assembly, comprising:
    a tube and an end piece, said tube including an end with
    at least one keying feature and said end piece including
    at least one mating keying feature, said keying feature and
    said mating keying feature coacting to allow relative
    axial movement between said tube and said end piece,
    but not allow relative rotational movement between said
    tube and said end piece.
16. The reel of claim 15, wherein said end of said tube is
    one of a drive end and an idler end, and said end piece is
    one of a drive end piece and an idler end piece.
17. The reel of claim 15, wherein said at least one keying
    feature is a plurality of recesses, and said at least one mating
    keying feature is a plurality of mating projections.
18. The reel of claim 17, wherein said plurality of recesses
    have a cross section with one of a circular, rectangular
    and square shape, and said plurality of projections have a mating
    cross section with one of a circular, rectangular and square
    shape.
19. The reel of claim 15, wherein each said keying feature
    is one of a recess and a projection, and each said mating
    keying feature is one of a mating recess and mating
    projection.
20. The reel of claim 15, wherein each said keying feature
    is a recess, and each said mating keying feature is a mating
    projection.
21. The reel of claim 20, wherein each said recess and each
    said mating projection have a cross section with one of a circular,
    rectangular and square shape.