May 31, 1949. D. S. REITZ 2,471,654

CAM FOR LEVEL WINDING DEVICES

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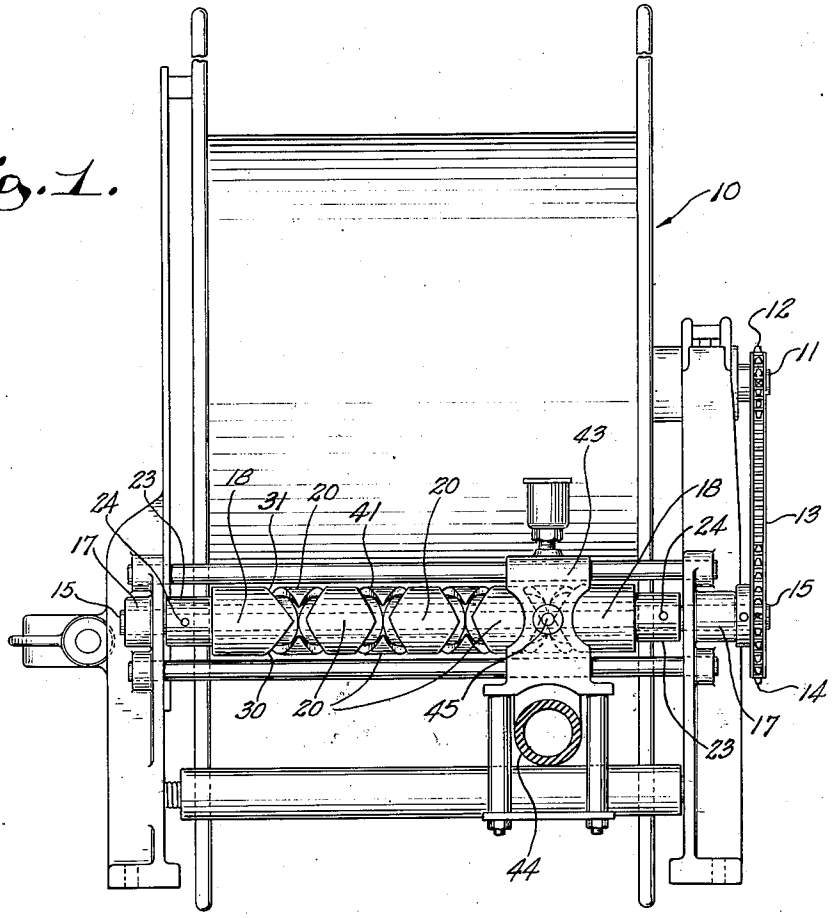
Fig. 1.



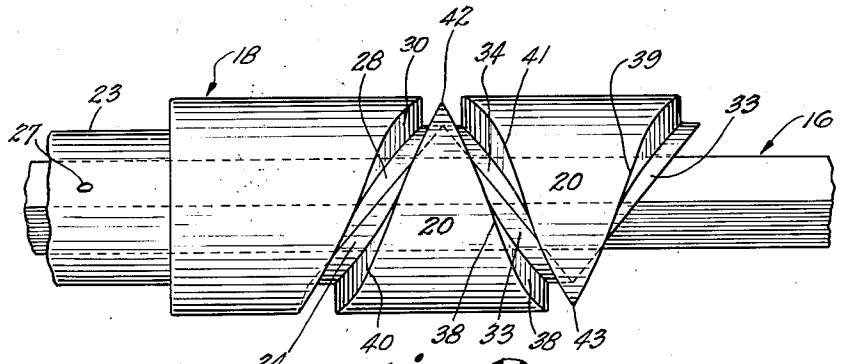


Fig. 2.

INVENTOR.
Donald S. Reitz
BY
Mosell & Mosell
ATTORNEYS.

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Fig. 3.

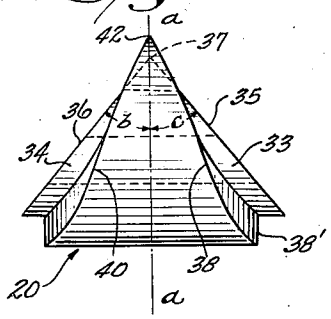


Fig. 4.

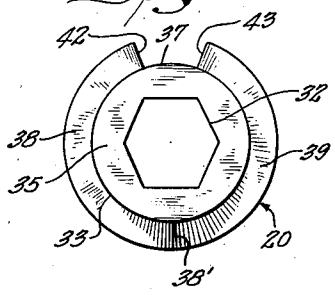


Fig. 6.

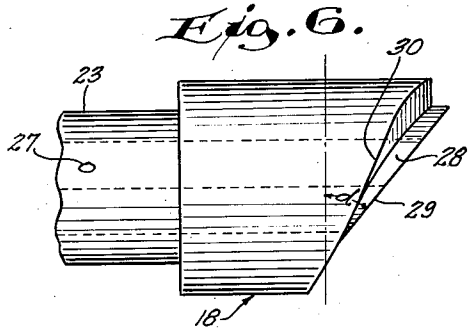


Fig. 7.

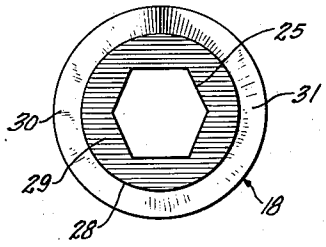


Fig. 5.

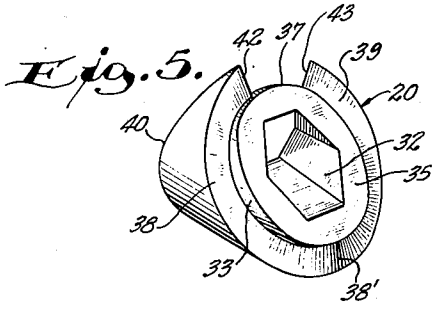
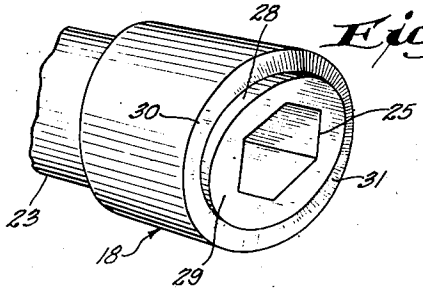


Fig. 8.



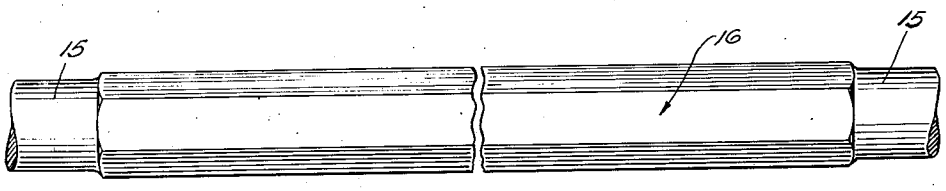


Fig. 9.

INVENTOR.
Donald S. Reitz
BY
Morsell & Morsell
ATTORNEYS.

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CAM FOR LEVEL WINDING DEVICES

Donald S. Reitz, Milwaukee, Wis., assignor to The Heil Co., Milwaukee, Wis., a corporation of Wisconsin

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4 Claims. (Cl. 74—567)

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This invention relates to improvements in cams for level winding devices and method of manufacturing the same.

It is quite common on hose reels or other winding drums to include level winding mechanism. This mechanism usually includes a shaft driven from the same source as the drum and having cam projections thereon. These projections form crossing right and left hand helical grooves for guiding a cam follower which projects from the line or hose guide. Inasmuch as drums and reels vary in width for different types of uses, it is, of course, necessary to provide a cam of proper length for each width. In the past it has been common practice to either cast the cam projections onto the shaft, entailing the provision of a special casting for each width of drum or to mill a helical groove to produce the required cam action. The latter procedure entailed a special machine setup for each width of drum.

It is a general object of the present invention to provide a method of manufacturing cams for level winding devices wherein like cam-forming sleeves are assembled on a shaft to provide a suitable cam of any selected length.

A further object of the invention is to provide an improved method as above described, wherein the cams are formed from three types of pieces: a core shaft piece which is square or hexagonal in cross-section, an end sleeve piece, and an intermediate sleeve piece.

A further object of the invention is to provide an improved method as above described, wherein the end sleeve pieces and intermediate sleeve pieces are preferably die-castings which are so designed as to readily pull out of the die, and which are also so designed as to cooperate with like pieces to form right and left hand helical crossing grooves when a plurality of said sleeves are assembled on the core shaft.

A further object of the invention is to provide an improved cam for level winding devices which is manufactured by the above described method.

With the above and other objects in view, the invention consists of the improvements in cams for level winding devices and method of manufacturing the same, and all its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all of the views:

Fig. 1 is a front elevational view of a hose reel which includes a cam manufactured in accordance with the present invention;

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Fig. 2 is an enlarged fragmentary front view showing a partially assembled cam;

Fig. 3 is a side view of one of the cam-forming intermediate sleeve sections;

Fig. 4 is an end view thereof;

Fig. 5 is a perspective view of the part illustrated in Figs. 3 and 4;

Fig. 6 is a side view of one of the cam-forming end sleeves, part being broken away;

Fig. 7 is an end view of the part illustrated in Fig. 6, looking at the cam forming end;

Fig. 8 is a perspective view of the end section of Fig. 6; and

Fig. 9 is a side view of the core shaft, parts being broken away.

Referring more particularly to the drawing, Fig. 1, which illustrates a hose reel 10, is only one example of a use for the improved level winding cam. The reel includes a suitably driven shaft 11 having a sprocket 12 thereon, and the latter is connected by an endless chain 13 with a sprocket 14. The sprocket 14 is rigidly mounted on one of the cylindrical ends 15 of the core shaft 16 (see Fig. 9). The major portion of the length of the core shaft is preferably hexagonal in cross-section, as illustrated. It may, however, be squared or it may be formed with splines or with any other equivalent of the hexagonal cross-section. The core shaft is preferably formed of cold rolled, hexagonal stock shafting. After it has been cut to a required length for a particular reel, its ends may be milled as at 15, so that they may be journaled in the bearings 17.

Slidably assembled on the core shaft are spaced and opposed end sleeves 18, each having one cam forming end, and a plurality of intermediate sleeves 20, each having two cam forming ends. All of the intermediate sleeves 20 are identical and are preferably die-cast from the same die.

Each end sleeve 18 is preferably formed with an extension 23 of reduced diameter which may be pinned to the core shaft as at 24 to prevent endwise movement. The two end sleeves 18, used on each level wind cam installation are identical, but are assembled in opposing positions. The end sleeves are preferably die-castings formed from the same die.

Referring now more particularly to Figs. 2, 6, 7 and 8, each end sleeve has an hexagonal bore 25 extending therethrough. This hexagonal shape is used when the core shaft 16 has the hexagonal cross-section. If, however, the core shaft

is squared, then there will be a square bore in the end sleeves in lieu of the bore 25 or, if the shaft 16 is splined, then the bore 25 will be correspondingly formed to cooperate with said spines. The cylindrical extension 23 at one end of each end sleeve is formed with a transverse hole 27 for receiving the pin 24. The reduced diameter extension 23 is, however, not essential as the sleeve may be of uniform diameter throughout the major portion of its length, if desired.

At the opposite end of each end sleeve there is a short extension 28, of reduced diameter, which is cut off at an oblique angle as at 29. The end of the main portion of the sleeve is cut off along a helical line with the helix extending in one direction half way around the circumference as indicated at the shoulder 30, and in a reverse direction for the other half of the circumference, as indicated at the shoulder 31. The extension 28 forms a part of the base for helical grooves when the parts are in final assembled position, and the cut-off shoulder portions 30 and 31 form the sides of the helical grooves.

An intermediate sleeve piece is illustrated in Figs. 3, 4 and 5. Each of these pieces is generally triangular in the side elevational view of Fig. 3. Each member is formed with a suitable core receiving bore such as the hexagonal bore 32, for receiving the hexagonal core shaft 16. Projecting from one end of the sleeve is an extension 33 and from the opposite end,an extension 34. These extensions have the same diameter as each other but are of reduced diameter with respect to the intermediate portion of the sleeve. The end 33 is cut off obliquely as at 35 and the end 34 is cut off on the same angle in a reverse direction as at 36. It is apparent that the angle *b* formed between the cut-off 36 and the transverse plane *a* is equal to the angle *c* formed by the cut-off 35 with said plane *a*. The angles *b* and *c* are also equal to the angle *d* of the end sleeve as is shown in Fig. 6. The cut-offs approximately meet at an apex 37. The intermediate portion of the sleeve is of greater diameter. One end is cut along a helical line 38 which extends nearly half way around the circumference from the peak 38' and on a reverse helical line 39 which extends from the peak 38' for nearly the other half of the circumference. At the other end of the sleeve are similar but reversely extending helical cuts 40 and 41. The shoulders formed by the cuts 38 and 40 meet at a point as at 42, and the shoulders formed by the cuts 39 and 41 meet at a point as at 43. The points 42 and 43 terminate short of meeting one another as is clear from Fig. 4 to provide a cross-over space for the crossing helical grooves.

The cut-off ends 35 and 36 which form equal angles *b* and *c*, as well as the cut-off end 29 which forms the angle *d*, equal to the angles *b* or *c*, will match each other when adjacent pieces in reversed positions are assembled on the core shaft as is clear from Figs. 1 and 2. For example, the extension portion 28 of the end sleeve of Fig. 2 complements the extension portion 34 of the adjacent intermediate sleeve piece to form a complete base for a portion of a helical groove. These extensions 28 and 34 also serve to space the helical shoulders 30 and 40, and 31 and 41 a proper distance apart. The shoulders 30 and 40 provide part of a helical groove extending in one direction, and the shoulders 31 and 41 on the opposite side (which are hidden in Fig. 2), form part of a helical groove extending in a reverse direction and form a continuation of the helical groove which

is shown in Fig. 2, and which is formed between the shoulders 38 and 41.

The slidable guide 43 on the hose reel is adapted to guide a length of hose 44 as it is being wound on the reel 10. The guide is formed with a cam follower which projects inwardly from the location 45 and which coacts with the cam grooves in the usual manner for level winding devices.

It is apparent from the above that the prior method of casting a special level winding cam for each width of reel or drum is no longer necessary, and that any width of cam member may be quickly formed from a piece of the shafting 16, two end pieces 18, and a selected number of intermediate pieces 20, depending upon the final length desired. The pieces 18 and 20 may be formed inexpensively by a die-casting method with the use of only two dies. The core shaft may be formed from standard cold rolled shafting of hexagonal cross-section, and all that is required are the simple operations of cutting the shafting off to proper length and milling the ends which are to be journalled.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated, as may come within the scope of the claims.

What I claim is:

1. A cam for a level winding device comprising a core shaft, a pair of identical end sleeves through which the core shaft non-rotatably extends, said end sleeves being spaced apart and having facing ends provided with helical shoulders arranged to form fragments of the sides of crossing level wind grooves, and a plurality of identical and interchangeable intermediate sleeves through which the core shaft non-rotatably extends mounted between the end sleeves, said intermediate sleeves each having both ends provided with helical shoulders which are complementary to the shoulders on the end sleeves, and said intermediate sleeves being assembled in alternately reversed position with the helical shoulders on one sleeve spaced from the helical shoulders on an adjacent sleeve.

2. A cam for a level winding device comprising a core shaft, a pair of end sleeves non-rotatably mounted in spaced position on said core shaft, said end sleeves having facing ends provided with helical shoulders arranged to form fragments of the sides of crossing level wind grooves and having projections of reduced diameter at said ends which project beyond the shoulders and are truncated by an oblique plane which extends in the same general direction as the shoulders, and a plurality of intermediate sleeves non-rotatably mounted on the core shaft between the end sleeves, each intermediate sleeve having both ends provided with helical shoulders which are complementary to the shoulders on the end sleeves and said intermediate sleeves having projections of reduced diameter at both ends which are truncated by oblique planes which intersect near the periphery of the sleeve and which extend at the same angle as the truncating plane of an end sleeve, the truncated ends of the sleeves being positioned in alternately reversed and abutting relationship to form bottoms of cam grooves and to maintain the helical shoulders on one sleeve spaced from the helical shoulders on an adjacent sleeve.

3. A cam for a level winding device comprising a core shaft, a pair of end sleeves non-rotatably mounted in spaced position on said core shaft, said sleeves having facing ends each provided

with a helical shoulder which extends in a right hand direction for a distance of approximately 180° and in a left hand direction for an equal distance and there being an end of reduced diameter projecting beyond said helical shoulders, said end being truncated by an oblique plane which extends in the same general direction as the shoulders, a plurality of intermediate sleeves non-rotatably assembled on the core shaft between said end sleeves, said intermediate sleeves each having both ends provided with helical shoulders which are complementary to the helical shoulders at the ends of the end sleeve, and there being a projection of reduced diameter at both ends of each intermediate sleeve, said projections being truncated by oblique planes which are at the same angles as the planes of the truncated ends of the end sleeves and which intersect each other near the periphery of the sleeve, and said sleeves being positioned with the truncated ends in alternately reversed and abutting relationship to form bottoms for cam-grooves and to maintain the helical shoulders of one sleeve spaced from the helical shoulders of an adjacent sleeve.

4. A cam for a level winding device comprising a core shaft; a pair of identical end sleeves through which the core shaft non-rotatably extends, said end sleeves being spaced apart and having facing ends provided with helical shoulders arranged to form fragments of the sides of crossing level wind grooves, and the facing ends of said end sleeves having substantially flat end surfaces which extend in the same general direction as the shoulders; and a plurality of identical intermediate sleeves through which the core shaft non-rotatably extends mounted between the end sleeves, said intermediate sleeves each having both ends provided with helical shoulders which are complementary to the shoulders on the end sleeves and said intermediate sleeves each having substantially flat end surfaces which extend at substantially the same angle as the flat end surface of an end sleeve, said intermediate sleeves being assembled in alternately reversed position with the end surfaces of adjacent sleeves in abutment and with the helical shoulders of one sleeve spaced from the helical shoulders of an adjacent sleeve.

DONALD S. REITZ.

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