

Nov. 14, 1939.

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2,179,523

WINDING REEL

Filed June 20, 1936

3 Sheets-Sheet 1

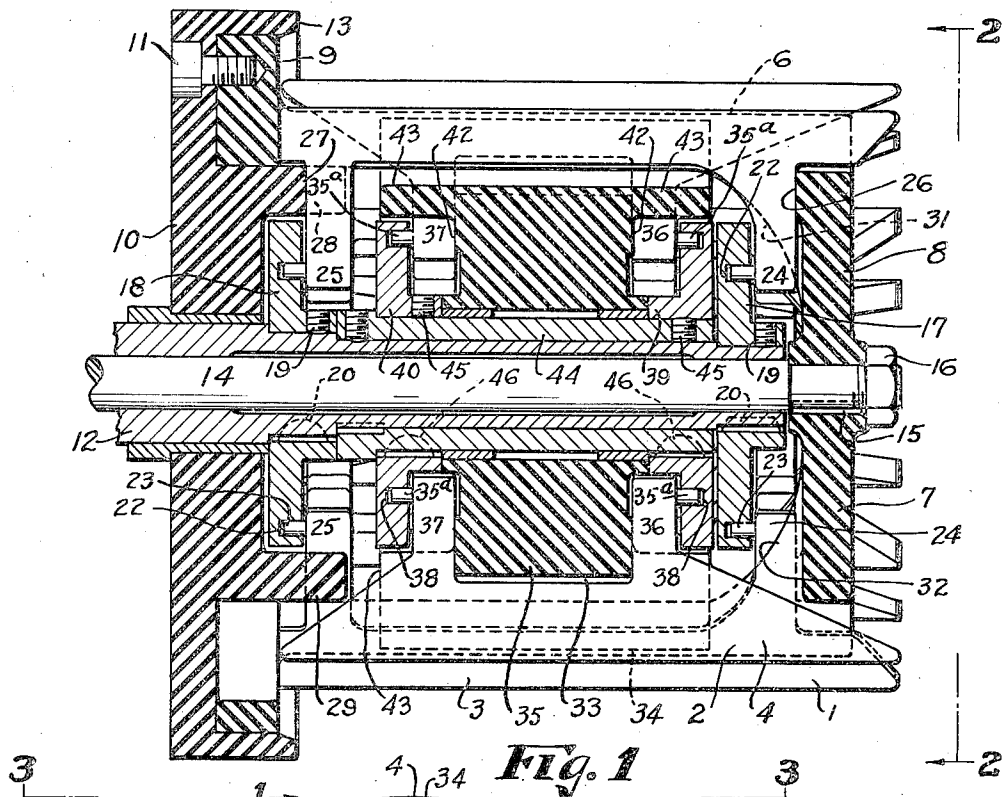


Fig. 1

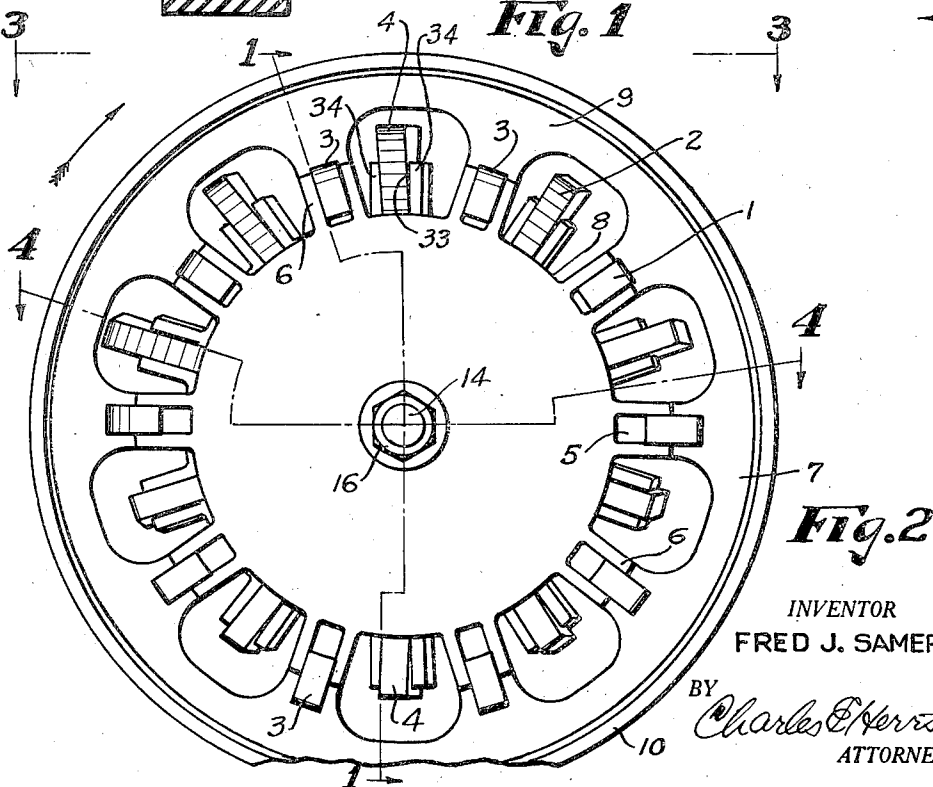


Fig. 2

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3 Sheets-Sheet 2

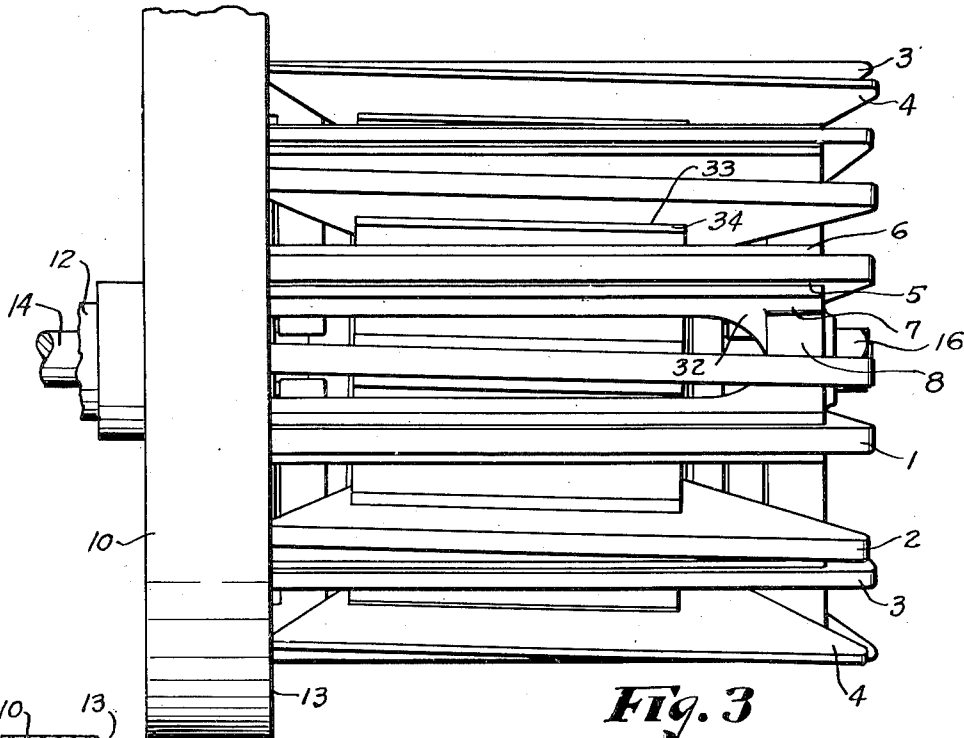


Fig. 3

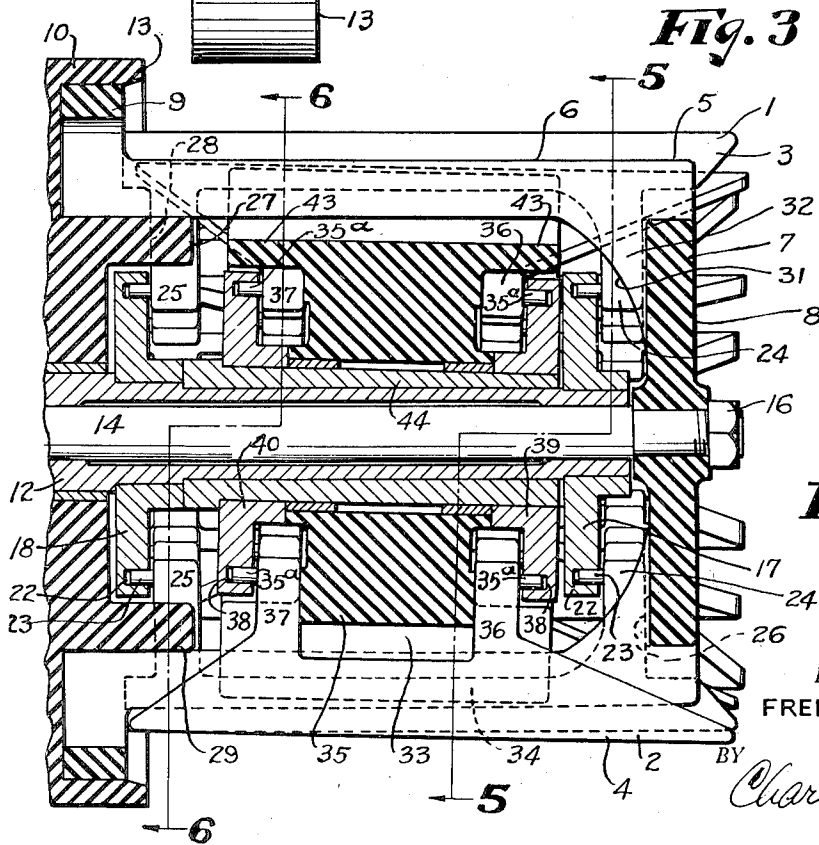


Fig. 4

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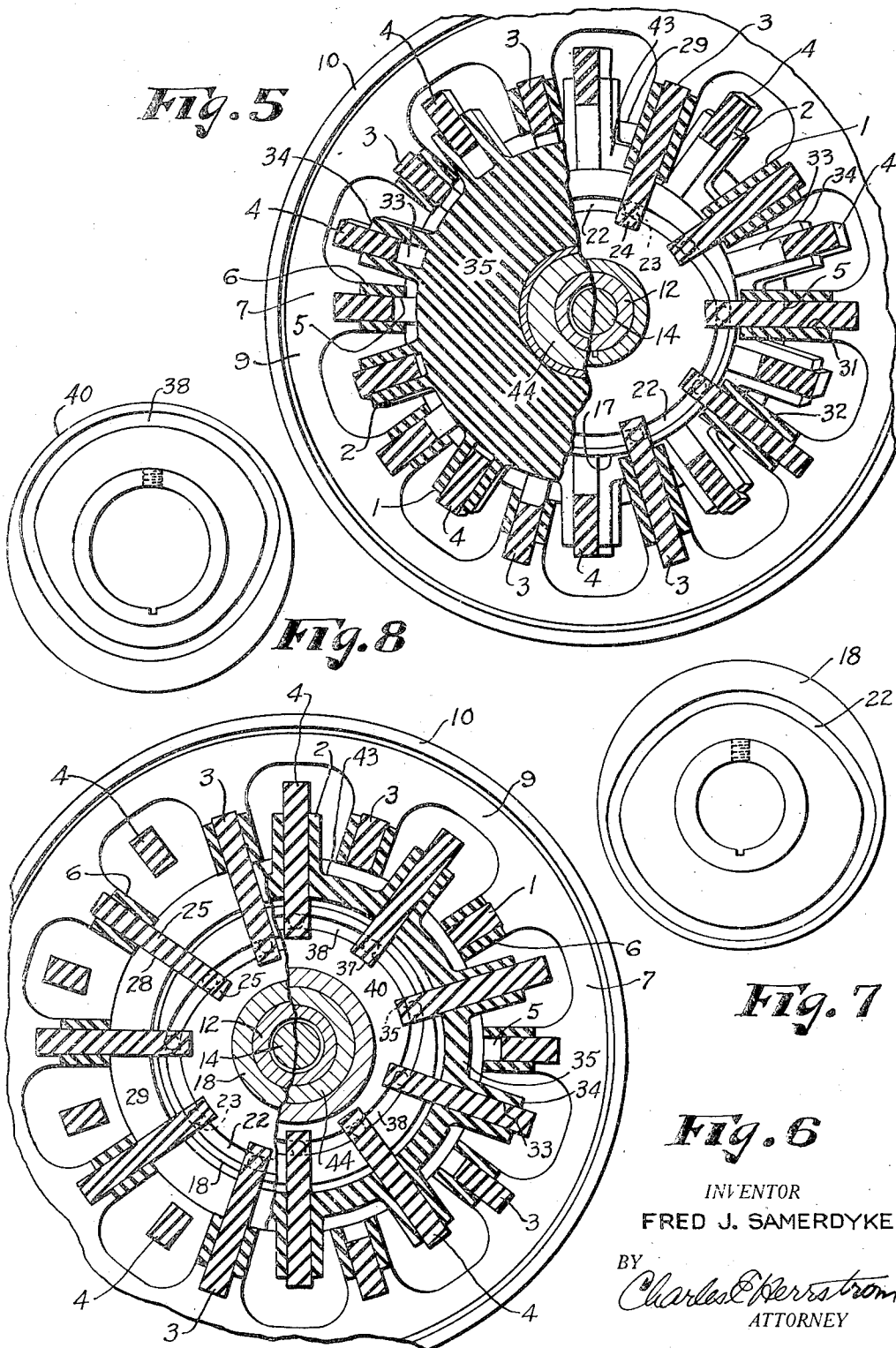
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,179,523

WINDING REEL

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Application June 20, 1936, Serial No. 86,365

14 Claims. (Cl. 242—53)

This invention concerns a novel form of winding reel.

More particularly, the invention relates to a generally cylindrical winding reel comprising a plurality of interdigitating sets of longitudinally extending bar members, such sets usually, but not necessarily, being two in number. By suitable arrangement or movement of the bar members of the respective sets, material such as thread or the like wound about the reel may be caused to advance lengthwise thereof in a plurality of spaced, generally helical turns. The present invention provides a reel of the above type in which the sets of bar members are disposed in askew relation to each other, at least one set being non-rigid and having bar members thereof adapted during the revolution of the reel to be laterally moved to positions in which they project beyond the periphery of the other set.

The thread or the like, because of such projection of the bar members of one set beyond those of the other set, is thus caused to be transferred from the bar members of one set to the bar members of the other set, while because of the askew relation of the sets of bar members, the thread is caused to advance lengthwise of the reel in a plurality of spaced generally helical turns. Since by means of a reel of this type a relatively long length of thread or the like may be temporarily continuously stored in a relatively small space in a plurality of spaced generally helical turns, such reels may be conveniently employed in the processing of thread or the like.

The reel illustrated as embodying the invention comprises two non-rigid, generally cylindrical, interdigitating sets of longitudinally extending bar members. The two sets of bar members are in askew relation to each other, the bar members of the two sets being adapted, as by cam means, to be moved radially of the axis of the reel in such manner that certain of the bar members of each set are projected laterally beyond the periphery of the other set. Rotation of the reel causes the thread or the like to wind on the reel, the lateral projection of the bar members of each set beyond the periphery of the other set resulting in a transfer of the thread or the like from one set of bar members to the other. The askew relation of the two sets of bar members causes thread or the like wound on the reel to progress lengthwise of the reel. Together, these factors bring about advance of the thread or the like in a plurality of spaced generally helical turns.

The reel of the present invention is preferably but need not necessarily be of cantilever con-

struction, as illustrated. The term "cantilever" is intended to express the thought that the reel is supported and driven from one end only, the other end of the reel being thus left wholly unobstructed. This feature provides manifold advantages, dependent in part on the use to which the reel is put. For instance, cantilever reels such as that provided by the present invention may be employed to particular advantage in the processing of thread or the like, since they lend themselves to disposition in arrangements in which, by virtue of their open-ended construction, threading up and other manipulation of the thread or the like stored on the reels, and inspection, replacement, adjustment, repair of the reels, etc., are very greatly facilitated.

In the drawings, in which one form of reel embodying the invention is illustrated, Figure 1 is a sectional elevation of the reel from line 1—1 of Figure 2. Figure 2 is an end elevation of the reel from line 2—2 of Figure 1. Figure 3 is a plan elevation of the reel from line 3—3 of Figure 2. Figure 4 is a sectional elevation substantially along line 4—4 of Figure 2. Figure 5 is an elevation from line 5—5 of Figure 4. Figure 6 is an elevation from line 6—6 of Figure 4. Figures 7 and 8 are detail views of two of the cam heads which may be provided to actuate the bar members of the two sets.

The reel illustrated in the drawings comprises two non-rigid interdigitating sets of longitudinally extending bar members disposed in askew relation to each other. In the drawings, these sets bear reference numerals 1 and 2, set 1 being comprised of bar members 3 and set 2 being comprised of bar members 4. The bar members of each set are adapted to be projected laterally beyond the bar members of the other set, but are incapable of movement longitudinally of the set. While the bar members of said sets may be mounted and actuated in various ways, in the embodiment shown the bar members 3 of set 1 are disposed in slots 5 formed in bar-like members 6 which are spaced around the periphery of cage-like member 7, the bar-like members 6 of cage-like members 7 being supported at one end thereof by a spider 8 and being provided at the other end with an external annular reinforcing ring 9. The latter may serve to reinforce the bar-like members 6 and may constitute a support by means of which the cage-like member 7 is supported at the operating end of the reel by an annular supporting member 10 fixed to the annular ring 9, as by cap screws 11. Annular supporting member 10, journaled on the frame 55

member 12 on which the reel is mounted, may be provided with a flange portion 13 extending over annular ring 9 to provide a guide for the thread or the like. The reel illustrated is driven by a shaft 14 journaled in frame member 12 on which spider 8 is fixed for rotation with the shaft 14 by key 15 and nut 16 on the end of shaft 14.

During rotation of the reel, the bar members 3 of set 1 are moved radially to positions in which they project beyond the periphery of set 2, as by means of cam heads 17 and 18. Said cam heads may be rigidly mounted on frame member 12 of the reel by set screws 19 and keys 20 and have formed therein suitably shaped cam grooves 22 in which are disposed pins 23 fixed to the corresponding finger-like portions 24 and 25 of bar members 3. In the embodiment illustrated, movement of the bar members 3 longitudinally of set 1 is prevented by contact of finger-like portions 24 thereof with surfaces 26 on spider 8 and by contact of finger-like portions 25 thereof with surfaces 27 on annular supporting member 10. The surfaces 27 may comprise the bottoms of slots 28 formed in an annular ring 29 on annular supporting member 10 (Figure 6), in which slots 28 the finger-like portions 25 of the bar members 3 may be disposed, in which case the finger-like portions 25 are held against twisting which may tend to arise out of the friction of their pins 23 in the cam grooves 22 of cam head 18. At the outer end of the reel, finger-like portions 24 of the bar members 3 may be similarly held against similar twisting by means of slots 31 formed in the reinforcing ribs 32 of cage-like member 7.

In the embodiment shown, the bar members 4 of set 2 are disposed in slots 33 of spaced bar-like members 34 formed on the periphery of a supporting member 35 which is rotatably mounted about frame member 12 inside of cage-like member 7 with the axis of supporting member 35 inclined to the axis of shaft 14 and consequently of cage-like member 7, as shown to advantage in Figure 4. The bar-like members 6 of cage-like member 7 and the bar-like members 34 of supporting member 35 are thus alternately disposed as shown in Figures 2, 5 and 6. During rotation of the reel, the bar members 4 of set 2 are moved radially with respect to supporting member 35 to positions beyond the periphery of set 1 by movement of the pins 35a, fixed to finger-like portion 36 and 37 of bar members 4, in the cam grooves 38 of cam heads 39 and 40 which are rigidly fixed with respect to frame member 12. The bar members 4 of set 2 may be confined against movement longitudinally of set 2 by means of suitable surfaces 42 formed on supporting member 35. Supporting member 35 may be formed as indicated with extending portions 43 having suitable slots therein by means of which the bar members 4 are given additional support and finger-like portions 36 are supported against twisting.

For convenience in construction and assembly of the reel, the cam heads 39 and 40 and rotatable supporting member 35 may be mounted, as in the illustrated embodiment and as shown to advantage in Figure 4, on an askew bushing 44 rigidly mounted on frame member 12. Askew bushing 44 may be formed with an internal cylindrical bore by means of which it is rigidly mounted on an external cylindrical surface formed on frame member 12 concentric with the axis of drive shaft 14. The external surface of askew bushing 44 may be cylindrical about an

axis inclined to a desired degree with respect to the axis of its internal bore and may have journaled on it supporting member 35 and mounted upon it as by set screws 45 and keys 46, the cam heads 39 and 40.

The cam heads 17 and 18 which actuate the bar members 3 of set 1 and cam heads 30 and 40 which actuate the bar members 4 of set 2 may have grooves therein of such form and so related that, as the reel rotates, the bar members 3 of set 1 are laterally projected beyond the bar members 4 of set 2 for part of a revolution, while for the remaining part of the revolution the bar members 4 of set 2 are projected beyond the bar members 3 of set 1. Preferred forms of cam grooves are shown in Figures 7 and 8, of which the former represents cam head 18 of set 1 while the latter represents cam head 40 of set 2. In Figure 7, the lower portion of cam groove 22 is an arc of a circle concentric about the axis of rotation of cage-like member 7, while the distances from such center to all parts of the remaining portion of cam groove are less than the radius of the circular arc portion of cam groove 22. In cam head 40, shown in Figure 8 in the angular relation it bears to cam head 18 of Figure 7, the upper portion of cam groove 38 is concentric about the inclined axis about which supporting member 35 rotates, while the distances from such center of rotation to all parts of the remaining portion of the cam groove 38 are less than the radius of the circular arc portion. It is apparent that the cam groove 22 in cam head 17 will be identical with the groove 22 in cam head 18, shown in Figure 7, while the groove 38 in cam head 39 will correspond to the groove 38 in cam head 40 shown in Figure 8.

In the operation of the reel, cage member 7 is rotated by shaft 14. Contact of the bar-like members 6 thereof with the bar-like members 34 of supporting member 35 causes said supporting member to rotate therewith. During such rotation, the pins of the bar members sliding in the various cam grooves cause certain of the bar members of each set to be projected laterally at any given time beyond the periphery of the other set. More specifically, as shown to best advantage in Figure 6, when the pins 23 of the bar members 3 of set 1 are disposed in the lower circular arc portions of cam grooves 22 in cam heads 17 and 18, such bar members 3 are projected beyond such of the bar members 4 of set 2 as have their pins 35a disposed in the lower portion of cam grooves 38 of cam heads 39 and 40; while such bar members 4 of set 2 as have their pins 35a in the upper circular arc portions of cam grooves 38 of cam heads 39 and 40 are laterally projected beyond such of the bar members 3 of set 1 as have their pins 23 in the upper portions of cam grooves 22 of cam heads 17 and 18. Thread or the like wound on the reel is thus transferred during rotation of the reel from the bar members of one set to the bar members of the other set.

Furthermore, during such rotation the thread or the like carried by each set of bar members travels in a plane perpendicular to the axis about which such bar members of such set of bar members are rotating. Since, in the illustrated embodiment, the relation of the various cam grooves and of the inclined axes is such that the bar members of each set carrying the thread or the like are rotating about an axis which is inclined to the axis about which are rotating the bar members of the other set, it is apparent each turn

of thread or the like during a revolution of the reel is advanced lengthwise of the reel by an amount depending upon the degree of inclination of the axes of the two sets and the diameter of the reel. The thread or the like is thus advanced 5 bodily lengthwise of the reel in a plurality of generally helical turns.

It will be understood that the direction of advance of the thread or the like lengthwise of the reel will be determined by the direction in which the bar members of the two sets are projected, the direction of the askew relation of the two sets of bar members, and the direction of rotation of the reel. Thus, for the reel illustrated 10 and for a direction of rotation indicated by the arrow in Figure 2, the thread or the like will advance lengthwise of the reel from left to right in Figure 1 or from the supported end to the unsupported end of the reel. This direction of 15 advance; i. e., from the supported end of the reel to the unsupported end, constitutes the preferred direction of advance in cantilever reels; but it is of course obvious that, by suitable modification of construction of the reel, the thread 20 or the like could be caused to advance in the opposite direction. It is further obvious that for a given reel diameter the degree of inclination between the two axes of the sets of bar members determines the pitch of the generally helical 25 turns of thread or the like being wound on the reel; that is, the greater degree of inclination, the greater the pitch of such turns of thread or the like.

The net effect is to cause thread or the like to 35 be wound, turn after turn, about the reel in generally helical form, the succession of turns meanwhile advancing bodily of the reel, in consequence of which fact thread or the like led to the reel may be stored thereon in the form of a 40 large number of closely spaced turns, as many as several hundred, depending on the length of the reel.

As is apparent from a study of the drawings, reels embracing the present invention may be 45 made up of parts which, to a large degree, may be of cast or molded construction. For instance, in the illustrated reel, the parts indicated by the heavy sectioning may be formed or molded of non-metallic materials, such, for instance, as 50 synthetic resin, while other parts such as the cams, pins, journals, etc., may be made up of metallic materials. It is understood that the reel described is but an illustrative embodiment of the invention, that various other embodiments 55 may be devised, and various modifications may be made in the above embodiment, and that apparatus embodying the invention may be employed in various uses other than that indicated, all without departing in any way from the spirit 60 of the invention. While the illustrative embodiment of the invention has been discussed in connection with the winding of thread or the like, it is apparent that reels embodying the invention may be employed to wind other materials: the 65 term "thread or the like" is intended to comprehend, besides thread-like materials, all materials capable of being wound on such reels.

It is intended that the patent shall cover, by suitable expression in the appended claims, 70 whatever features of patentable novelty reside in the invention.

What is claimed is:

1. A reel comprising two interdigitating sets of longitudinally extending bar members, at least 75 one of said sets being of non-rigid construction;

means for supporting said sets of bar members in inclined relation to each other; and means for independently moving the bar members of said non-rigid set to positions in which they project laterally beyond the periphery of the other set. 5

2. A reel of generally circular cross section comprising two interdigitating sets of longitudinally extending bar members, at least one of said sets being made up of non-rigidly mounted bar members incapable of independent movement 10 lengthwise of said set; means for supporting said sets of bar members in inclined relation to each other; and means for moving the bar members of said non-rigid set radially of said reel.

3. A cantilever reel of generally circular cross 15 section comprising two interdigitating sets of longitudinally extending bar members, at least one of said sets being made up of non-rigidly mounted bar members incapable of independent movement lengthwise of said set; a frame member supported from one end only thereof; means 20 for supporting said sets of bar members from said frame member in inclined relation to each other, the structure defined by said sets of bar members having the end thereof opposite the end with 25 which said frame member is associated wholly unobstructed; and means for moving the bar members of said non-rigid set radially of said reel.

4. A reel comprising two interdigitating sets of 30 longitudinally extending bar members, at least one of said sets being made up of non-rigidly mounted bar members capable of independent movement; means for supporting said sets of bar members in inclined relation to each other; and 35 means for independently moving the bar members of said non-rigid set in such manner that at any given time at least some of the bar members thereof are projected beyond the periphery of the other set. 40

5. A cantilever reel comprising two interdigitating sets of longitudinally extending bar members, at least one of said sets being made up of non-rigidly mounted bar members capable of independent movement; a frame member supported from one end only thereof; means for supporting said sets of bar members from said frame member in inclined relation to each other, the structure defined by said sets of bar members having the end thereof opposite the end with 50 which said frame member is associated wholly unobstructed; and means for moving the bar members of said non-rigid set in such manner that at any given time at least some of the bar members thereof are projected beyond the periphery of the other set. 55

6. A cantilever reel comprising two interdigitating sets of longitudinally extending bar members, at least one of said sets being made up of non-rigidly mounted bar members incapable of independent movement lengthwise of said set; a frame member supported from one end only thereof; means for supporting said sets of bar members from said frame member, the structure defined by said sets of bar members having the 65 end thereof opposite the end with which said frame member is associated wholly unobstructed; and means for laterally projecting the bar members of said non-rigid set beyond the periphery of the other set. 70

7. A reel comprising two interdigitating sets of longitudinally extending bar members, each of said sets being made up of non-rigidly mounted bar members incapable of independent movement longitudinally of said set, and, associated 75

therewith, means for independently moving the bar members of each of said sets to positions in which they project laterally beyond the periphery of the other set.

- 5 8. A cantilever reel comprising two interdigitating sets of longitudinally extending bar members, each of said sets being made up of non-rigidly mounted bar members incapable of independent movement longitudinally of said set;
10 a frame member supported from one end only thereof by means of which are carried said sets of longitudinally extending bar members, one end of the structure defined by said sets of bar members being wholly unobstructed; and, associated
15 with said frame member, means for independently moving the bar members of each of said sets to positions in which they project laterally beyond the periphery of the other set.

9. A reel comprising two interdigitating non-rigid sets of longitudinally extending bar members; means for supporting said non-rigid sets of bar members in inclined relation to each other; and means for independently moving the bar members of each of said sets to positions in
20 which they project laterally beyond the periphery of the other set.

10. A cantilever reel comprising two interdigitating, non-rigid sets of longitudinally extending bar members; a frame member supported from one end only thereof; means for supporting said non-rigid sets of bar members in inclined relation to each other from said frame member, the structure defined by said sets of bar members having the end thereof opposite
30 the end with which said frame member is associated wholly unobstructed; and means for independently moving the bar members of each of said sets to positions in which they project laterally beyond the periphery of the other set.

- 40 11. A reel comprising two interdigitating, non-rigid, generally cylindrical sets of longitudinally extending bar members, each of said sets being

made up of bar members incapable of independent movement lengthwise of said set; means for supporting said sets of bar members in inclined relation to each other; and means for independently moving the bar members of each of said sets radially of said set. 5

12. A cantilever reel comprising two interdigitating non-rigid sets of longitudinally extending bar members, each of said sets being made up of bar members incapable of independent movement lengthwise of said set; a frame member supported from one end only thereof; means for supporting said sets of bar members in inclined relation to each other from said frame member, the structure defined by said sets of bar members having the end thereof opposite the end with which said frame member is associated wholly unobstructed; and means for independently moving the bar members of each of said sets radially of said set. 10 15 20

13. A reel comprising two interdigitating sets of longitudinally extending bar members, at least one of said sets being made up of non-rigidly mounted bar members incapable of independent movement lengthwise of said set; means for supporting said sets of bar members in inclined relation to each other; and, associated with said set of non-rigidly mounted bar members, cam means for positively moving the bar members of said set beyond the periphery of the other set. 25 30

14. A cantilever reel comprising two interdigitating sets of longitudinally extending bar members, at least one of said sets being of non-rigid construction; a frame member supported from one end only thereof; means for supporting said sets of bar members from said frame member in inclined relation to each other, the structure defined by said sets of bar members having the end thereof opposite the end with which said frame member is associated wholly unobstructed. 35 40

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