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S. M. STONE ET AL

2,340,436

LEVEL WINDER

Filed July 2, 1942

3 Sheets-Sheet 1

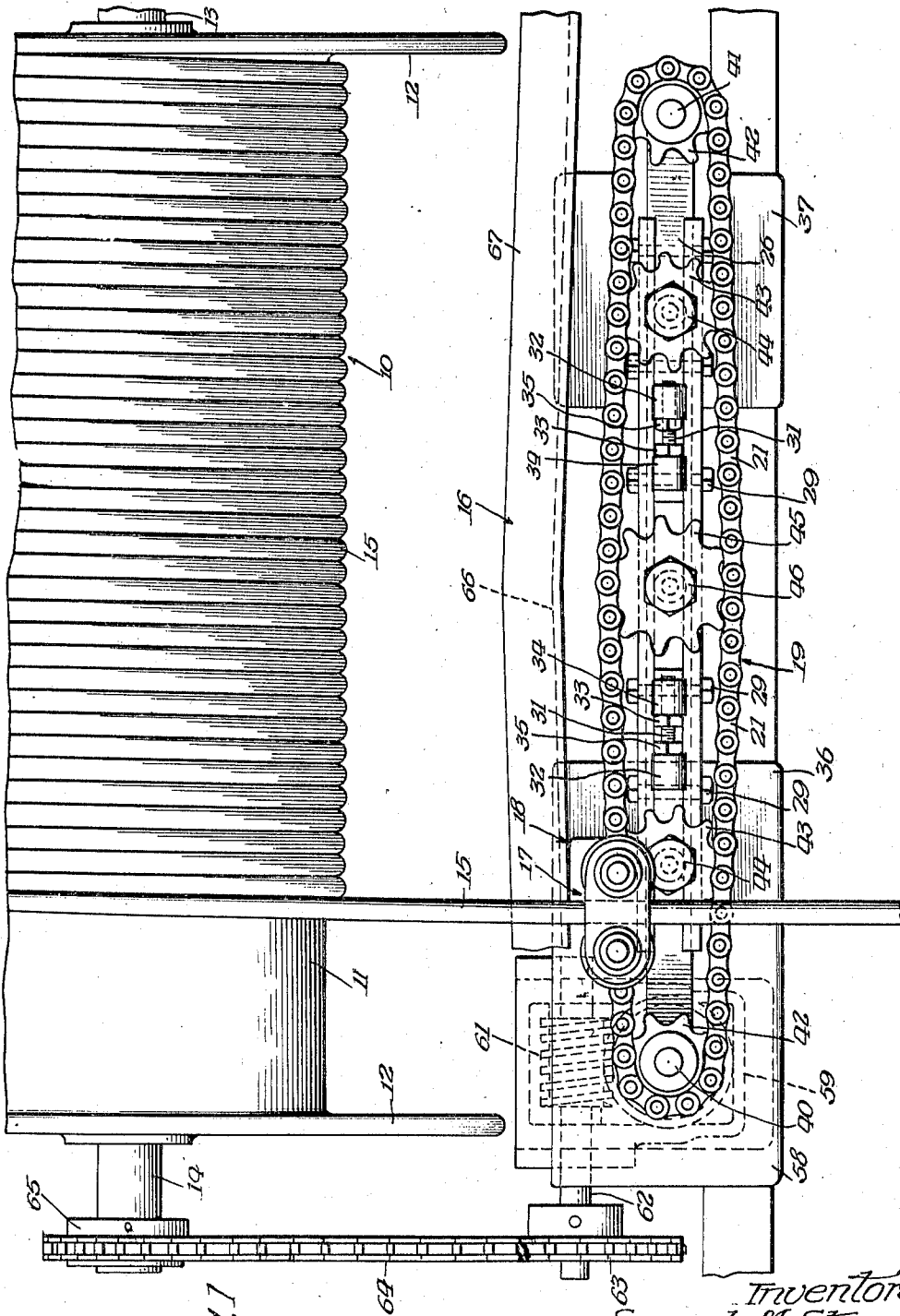


Fig. 1

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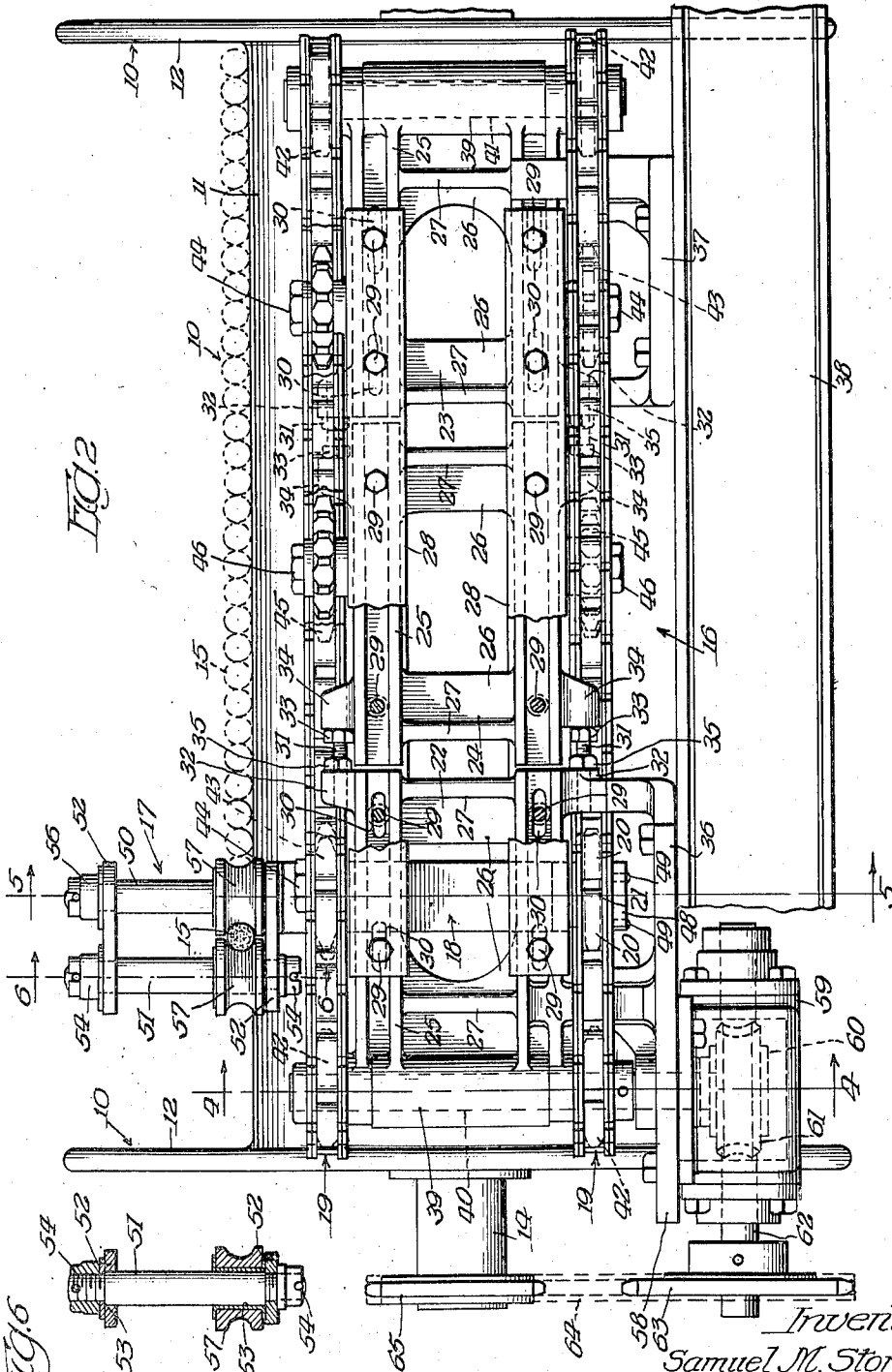
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LEVEL WINDER

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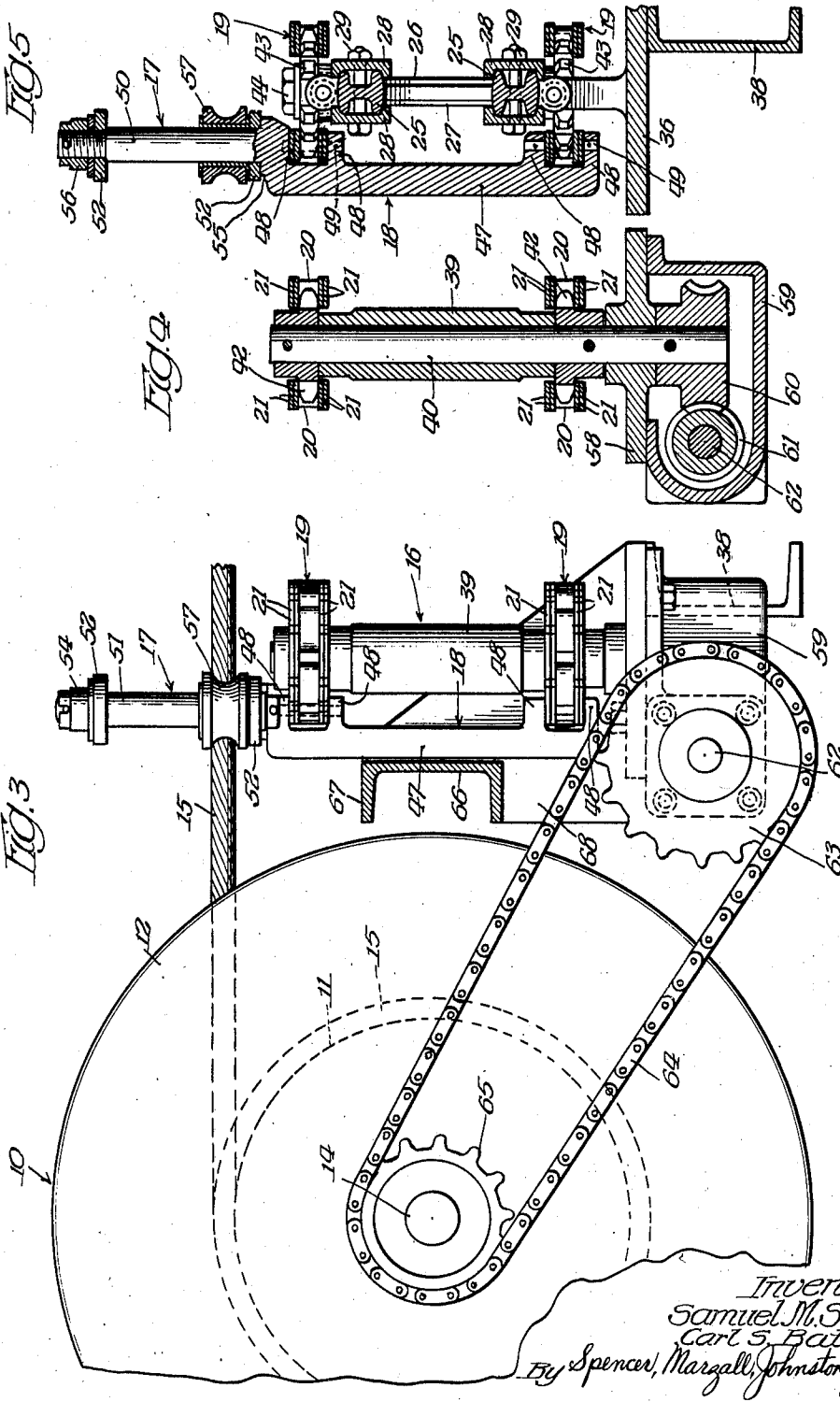
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UNITED STATES PATENT OFFICE

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LEVEL WINDER

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Chicago, Ill., assignors, by mesne assignments,
of seven-eighths to Stone Wheel Inc., Chicago,
Ill., a corporation of Illinois, and one-eighth to
Carl S. Bates

Application July 2, 1942, Serial No. 449,440

18 Claims. (Cl. 242—158)

This invention relates to a level winder and more particularly to a level winder for the winding drums of winches and the like.

A primary object of the invention is the provision of improved apparatus adapted to be associated with a winding drum and providing for levelly and evenly winding a cable or the like around the drum with each layer of the wound cable properly and evenly disposed upon a preceding layer of wound coils.

A further object is the provision of such apparatus which may be mounted independently of its associated drum and is readily applicable to existing winches, hoists and the like.

A further object is the provision of a level winder that is readily adjustable to drums of different widths and cables of different sizes.

A still further object is the provision of a level winder in which the load on a cable guide is distributed over a plurality of spaced driving members whereby effective leverage is maintained on the cable guide against distortional strain of the cable load.

Still another object is the provision of a level winder having a swivelly mounted cable guide head and a plurality of spaced, parallel, synchronously moving, endless chain members for carrying and driving the guide head.

A further object is the provision of a new and improved sectional frame structure for supporting a level winding apparatus.

These and other objects and advantages will be apparent from the following description, the appended claims and the accompanying drawings, which illustrate a selected embodiment of the invention, and in which:

Fig. 1 is a plan view of a winding drum having a level winder constructed in accordance with the present invention associated therewith;

Fig. 2 is a front elevational view of the apparatus shown in Fig. 1;

Fig. 3 is an end elevational view taken at the left-hand side of Figs. 1 and 2;

Fig. 4 is a sectional detail taken along the line 4—4 of Fig. 2;

Fig. 5 is a sectional detail taken along the line 5—5 of Fig. 2; and

Fig. 6 is a sectional detail taken along the line 6—6 of Fig. 2.

Referring to the drawings, the reference numeral 10 designates the winding drum of a winch or the like. The drum 10 comprises a cylindrical drum portion 11 and a pair of side or end flanges 12, and is rotatably supported in suitable bearing members, not shown, by means of outwardly ex-

tending shafts 13 and 14. The winding drum is adapted to be rotated by any suitable power means, also not shown, to effect the winding of a cable 15 or the like upon the drum portion 11 between the flanges 12.

A level winder designated generally by the reference numeral 16 is associated with the drum 10 adjacent its forward side and provides for levelly and evenly winding the cable 15 on the drum with each successive layer of the wound cable properly and evenly disposed upon a preceding layer of wound coils.

In accordance with the present invention the level winder 16 comprises a swivelly mounted guide head 17, a carrier 18 for supporting the guide head, and a plurality of spacer driving members 19 for moving the carrier 18 and head 17 through a predetermined orbital path. In the illustrated embodiment two such driving members 19 are shown and each comprises an endless roller chain having rollers 20 pivotally connected together by links 21.

The entire level winding mechanism is carried by a structural main frame structure which extends longitudinally of the drum 10 and comprises a pair of end sections 22 and 23 and one or more intermediate sections 24, as best shown in Fig. 2. The main frame is thus adjustable to winding drums of different widths by merely inserting a desired number and length of intermediate sections 24 between the end sections 22 and 23. Only one intermediate section 24 is shown in the drawings, but any desired number of such sections may be employed to obtain the desired length of frame as hereinafter described.

As best shown in Fig. 5 each of the main frame sections, including the intermediate section or sections, comprises upper and lower substantially I-shaped sections 25 joined together by webs 26 and strengthening ribs 27. The various end and intermediate sections of the main frame are united into a rigid unitary structure by means of four channel members 28 which extend longitudinally of the frame sections and engage about the upper and lower I-shaped portions 25 of the frame sections at each side thereof. The respective upper and lower channels 28 are rigidly clamped to the respective frame sections by bolts 29 which extend through suitable openings provided in the channels and the I-shaped portions of the frame sections. The channels 28 and bolts 29 thus provide a rigid frame structure and at the same time provide for readily adjusting the length of the frame by permitting the insertion

of any desired number of intermediate sections 24.

To provide for fractionally adjusting the length of the main frame, both to accommodate the main frame to winding drums of varying widths and to maintain the driving chains taut, the openings in the end sections 22 and 23 through which the bolts 29 pass are made in the form of elongated slots 30, as clearly shown in Fig. 2. Thus the end sections 22 and 23 may be properly adjusted with respect to the intermediate section or sections. The main frame is maintained in its proper adjusted length by means of adjusting screws 31 which are threaded into upwardly and downwardly extending lugs 32 provided on the end sections 22 and 23, as illustrated in Fig. 2. The adjusting screws 31 have heads 33 which engage against cooperating lugs 34 attached to the intermediate frame section 24, and a locking nut 35 maintains the screws in proper adjusted position.

The end sections 22 and 23 also include downwardly extending portions or feet 36 and 37 which provide a support for the main frame. The supporting portions 36 and 37 are adapted to be mounted on any suitable base member, such as the channel 38, which may be entirely independent of the base for the winding drum 10, whereby the level winder is applicable to existing winches and the like. Each of the end sections 22 and 23 also includes vertically extending bearing portions 39 in which shafts 40 and 41 having upper and lower sprockets 42 fixed thereto are rotatably mounted.

Each of the end sections 22 and 23 of the main frame also includes upwardly and downwardly extending bosses upon which idler sprockets 43 are rotatably mounted by means of bolts 44. The intermediate frame section 24 likewise includes upwardly and downwardly extending bosses upon which idler sprockets 45 are rotatably mounted by means of bolts 45. If more than one intermediate section is used, each of these sections preferably includes an idler sprocket 45. The driving chains 19 train around the respective upper and lower sprockets 42, 43 and 45 and the relative sizes of these sprockets are so coordinated that the carrier 18 for the guide head 17 will travel around the end sprockets 42 at a desired speed.

The carrier 18 for supporting the guide head 17 comprises an elongated plate member 47 which extends vertically between the driving chains 19 and is attached to each of these chain members, thereby to effectively support the guide head against distortional strain of the cable load. As best shown in Figs. 3 and 5 the carrier plate 47 is provided with inwardly extending lugs 48 which project over and under the links 21 of the chain members 19. The carrier plate 47 is operatively attached to the chain members 19 by means of pins 49 which form extensions of the pins for pivotally connecting the chain links 21 with the rollers 20. To prevent rotation of the carrier 18 about its connection with the chain members 19, the plate 47 is preferably of such width that the lugs 48 are connected to two adjacent pins 49 forming the connection between a link 21 and rollers 20 as illustrated in Fig. 2.

The guide head 17 comprises a pair of vertically extending shafts 50 and 51 which, as above described, provide a swivelly mounted cable guide upon the carrier 18. The shaft 50 is rigidly mounted in the upper end of the carrier plate 47 and may be integral therewith as illustrated

in Fig. 5. The shaft 51 has a pair of transversely extending plates 52 attached thereto by means of shoulder portions 53 and nuts 54. The plates 52 are rotatably received upon the shaft 50 between a boss 55 and a locking nut 56.

A pair of sheaves 57 are slidably mounted upon the shafts 50 and 51 for sliding movement between the plates 52. The sheaves 57 are of such size as to properly receive and guide the cable 15 therebetween, and are freely rotatable on the shafts 50 and 51. Thus as the head 17 is moved about the traverse of the chains 19, the cable 15 is guided freely along the length or width of the drum 10, and the sheaves 57 are adapted to move upwardly as each succeeding layer of the cable is wound upon the drum.

The downwardly extending foot portion 36 of the end section 22 also includes an arm 58 which projects outwardly beneath the bearing portion 39. This arm 58 supports a housing 59 within which a worm drive for the shaft 40 is operatively mounted. As illustrated in Figs. 1, 2 and 4, the worm drive comprises a worm wheel 60 attached to a downwardly extending portion of the shaft 40 and a worm 61 mounted upon a shaft 62 rotatably carried by the housing 59. A sprocket 63 is attached to the shaft 62 and is operatively connected to the winding drum 10 by means of a chain 64 which extends about a sprocket 65 fixed to the drum shaft 14.

During the travel of the carrier 18 and guide head 17 along the back reaches of the chains 19, the plate 47 of the carrier is preferably given additional guiding support by means of a guide plate 66, Figs. 1 and 3, which extends along the rear side of the winder parallel to the chains 19. The guide plate 66 may be in the form of a channel member 67, as shown, to give it additional rigidity and is positioned intermediate the upper and lower driving chains 19. Any suitable means such as upwardly extending brackets 68 may be provided for supporting the guide plate 66 on the base member 38.

A level winder is thus provided which is adapted to be applied to any existing winch or the like and which provides for levelly and evenly winding a cable or the like upon a winding drum. The guide head for the cable is so supported by the plurality of spaced endless chain members as to prevent distortion thereof under the cable load. The swivelly mounted guide head together with the rotatably and slidably mounted sheaves 57 provide for freely feeding the cable to the drum. The sectional main frame together with the adjusting screws 31 provide for adjusting the level winder to drums of any desired width or length. The winder may be readily adjusted to any desired cable size by merely changing the drive sprockets 63 and 65 and the guide sheaves 57. The sprockets 63 and 65 are easily removed and the guide sheaves 57 are readily changed by merely unscrewing the locking nuts 54 and 56.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plu-

ality of endless members for movement therewith, and a guide member for a cable or the like mounted upon said carrier member.

2. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless members for movement therewith, and a self aligning guide member for a cable or the like swivelly mounted upon said carrier member.

3. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, each of said endless members comprising an endless chain, a carrier member attached to said plurality of endless members for movement therewith, and a self aligning guide member for a cable or the like swivelly mounted upon said carrier member.

4. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless members for movement therewith, and a self aligning guide member for a cable or the like swivelly mounted upon said carrier member, said guide member comprising a pair of parallel shafts and rotatable guide sheaves slidably mounted upon each of said shafts.

5. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless members for movement therewith, a self aligning guide member for a cable or the like swivelly mounted upon said carrier member, and means for synchronously driving said endless members from said winding drum.

6. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless members for movement therewith, a self aligning guide member for a cable or the like swivelly mounted upon said carrier member, means for supporting said main frame independently of the support for said winding drum, and means including a sprocket and chain for synchronously driving said endless members from said winding drum.

7. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless members for movement therewith, a self aligning guide member for a cable or the like swivelly mounted upon said carrier member, each of said endless members comprising a chain having rollers pivotally connected together by connecting links, and said carrier member being attached to each of said chains by a pair of pivot pins connecting two of said rollers with one of said links.

8. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plu-

ality of endless members for movement therewith, a self aligning guide member for a cable or the like swivelly mounted upon said carrier member, said frame comprising a plurality of separate sections providing for varying the length of the frame, and means for detachably connecting said sections into a rigid unitary structure.

9. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless members carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless members for movement therewith, a self aligning guide member for a cable or the like swivelly mounted upon said carrier member, said frame comprising a plurality of separate sections detachably connected together, and means for adjusting the distance between a plurality of said frame sections to vary the length of the frame.

10. In a level winder of the character described, a sectional main frame comprising a pair of end sections adapted to have one or more intermediate sections clamped therebetween to vary the length of the frame, means including a plurality of longitudinally extending channel members for uniting said end sections and a desired number of intermediate sections into a rigid frame structure, and means for adjusting the spacing between said end sections and at least one intermediate section.

11. In a level winder of the character described, a sectional main frame comprising a pair of end sections adapted to have one or more intermediate sections clamped therebetween to vary the length of the frame, means for uniting said end sections and a desired number of intermediate sections into a rigid frame structure, and at least one of said end sections including a bearing member for supporting a drive shaft having spaced sprockets attached thereto.

12. In a level winder of the character described, a sectional main frame comprising a pair of end sections adapted to have one or more intermediate sections clamped therebetween to vary the length of the frame, means for uniting said end sections and a desired number of intermediate sections into the rigid frame structure, at least one of said end sections including a bearing member supporting a drive shaft having spaced sprockets attached thereto, worm drive means for said drive shaft carried by said one end section, and means including a sprocket and chain for driving said worm drive means.

13. In a level winder of the character described, a sectional main frame comprising a pair of end sections adapted to have one or more intermediate sections clamped therebetween to vary the length of the frame, means for uniting said end sections and a desired number of intermediate sections into a rigid frame structure, each of said end sections including a bearing member for supporting a shaft having spaced sprockets attached thereto, and a plurality of spaced idler sprockets carried by each of said end sections interiorly of said first named sprockets.

14. In a level winder of the character described, a sectional main frame comprising a pair of end sections adapted to have one or more intermediate sections clamped therebetween to vary the length of the frame, means for uniting said end sections and a desired number of intermediate sections into a rigid frame structure, each of said end sections including a bearing mem-

ber for supporting a shaft having spaced sprockets attached thereto, a plurality of spaced idler sprockets carried by each of said end sections interiorly of said first named sprockets, and a plurality of spaced idler sprockets carried by each of said intermediate sections.

15. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless chains carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless chains for movement therewith, a self aligned guide member for a cable or the like swivelly mounted upon said carrier member, and means including a plurality of sprockets spaced along the length of said frame for controlling the path of movement of said chains and the carrier member attached thereto.

16. A level winder for a winding drum comprising a main frame, a plurality of spaced parallel endless chains carried by said main frame for movement through a predetermined orbital path, a carrier member attached to said plurality of endless chains for movement therewith, a self aligned guide member for a cable or the like swivelly mounted upon said carrier member, and means including a plurality of idler sprockets and a longitudinally extending guide rail for controlling the path of movement of said chains and the carrier member attached thereto.

17. A level winder for a winding drum comprising a main frame having a plurality of separate sections providing for varying the length of

the frame, means for uniting a desired number of said sections into a rigid frame structure, a pair of spaced parallel endless chains carried by said main frame for movement through a predetermined orbital path, a carrier member extending transversely of said pair of chains, means for rigidly attaching said carrier member to each of said chains, a self aligned guide member for a cable or the like swivelly mounted upon said carrier, said guide member including a pair of parallel shafts and a pair of sheaves rotatably and slidably mounted upon said shafts, drive means for synchronously operating said chains carried by one of said frame sections, and means for driving said drive means from said winding drum.

18. In a level winder of the character described, a plurality of endless members movable through an orbital path, a carrier member rigidly attached to said plurality of endless members for movement therewith, and a guide member for a cable or the like mounted upon said carrier member, said guide member comprising a shaft extending outwardly from said carrier member, a second shaft parallel to said first named shaft, a pair of spaced plate members attached to said second shaft and pivotally mounted upon said first named shaft, a pair of sheaves rotatably and slidably mounted upon said shafts between said plate members, and means for detachably maintaining said plate members and said sheaves upon said shafts.

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