

March 16, 1954

T. C. SMITH
REEL ASSEMBLY

2,672,303

Filed July 26, 1952

2 Sheets-Sheet 1

Fig. 1.

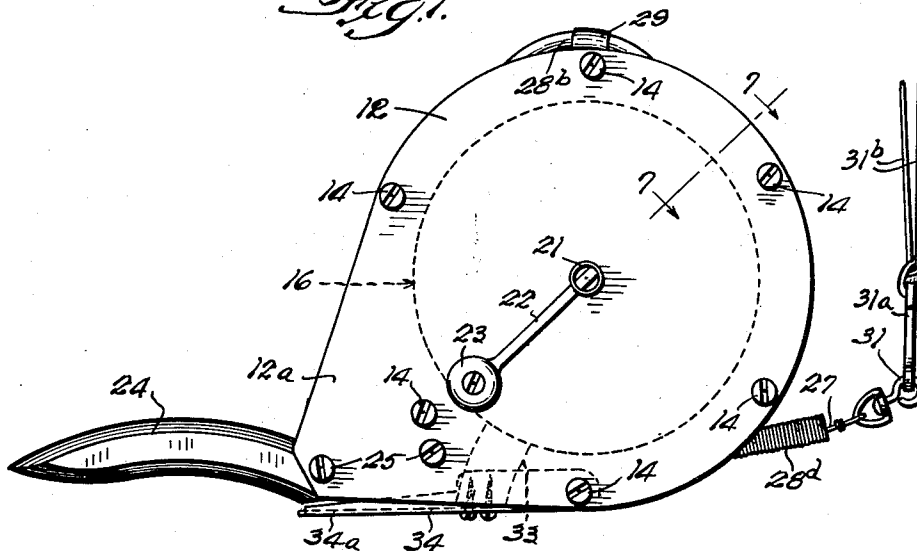


Fig. 2.

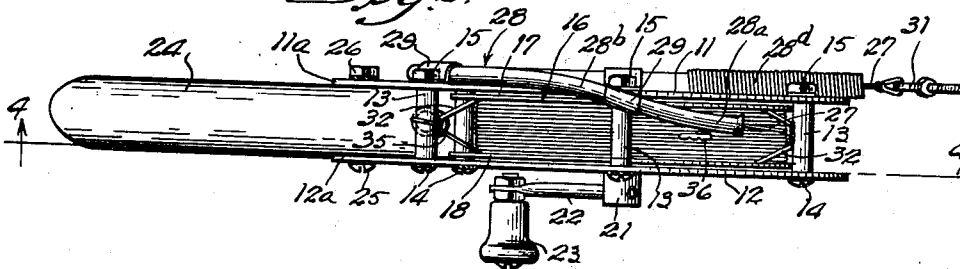


Fig. 3.

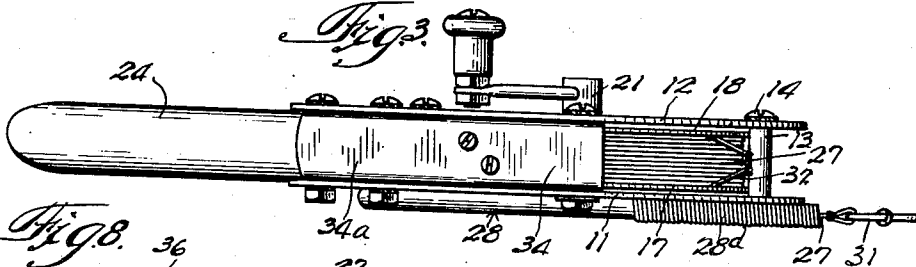
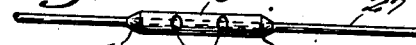


Fig. 8.



Fig. 9.



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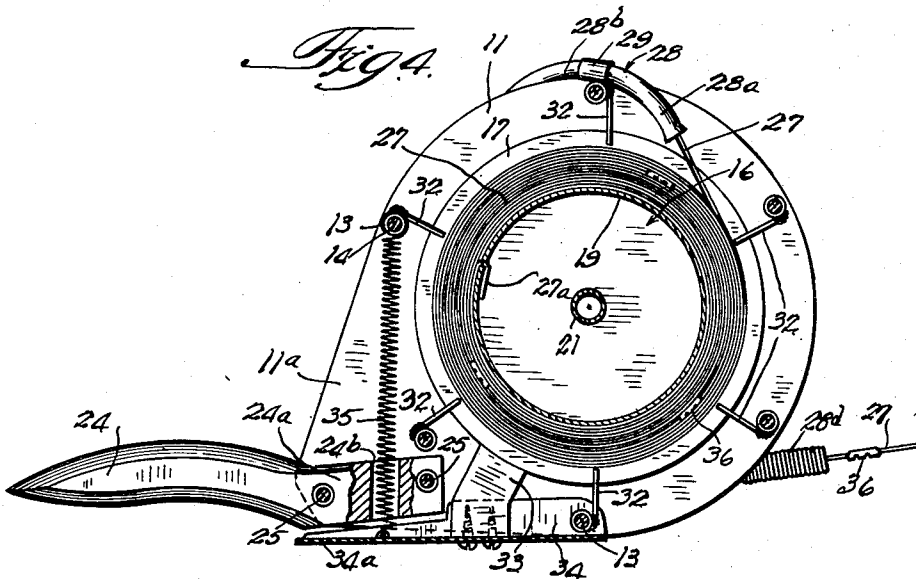
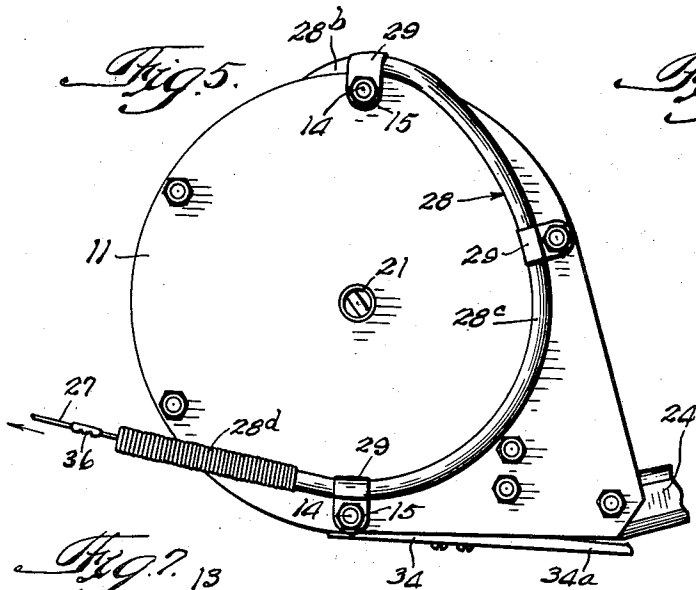
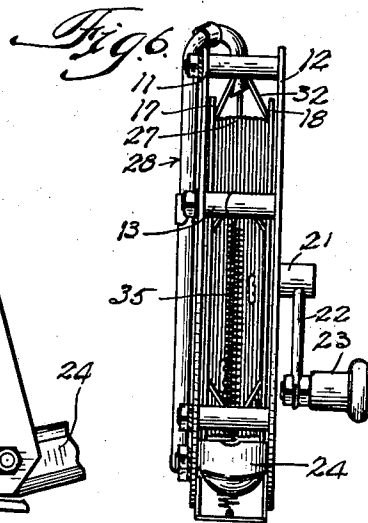
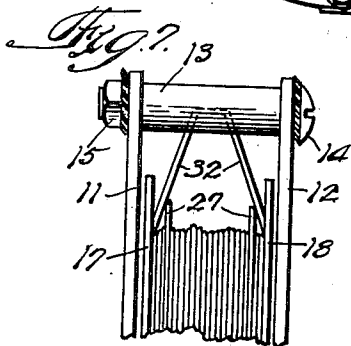
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REEL ASSEMBLY

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11 Claims. (Cl. 242-97)

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This invention relates to a reel assembly and has particular relation to a device of this nature including a measuring wire for use in making long measurements, as by surveyors, construction crews, etc.

Measuring tapes heretofore used for the purposes mentioned have generally been of the type known as steel chain tapes, consisting of flat steel bands having etched or other distance markings thereon. These have been ordinarily provided with hand reels for coiling up the tapes when not in use. Tapes and reels of this type for use in making long measurements, such as several hundred feet, are heavy and cumbersome to use and are very expensive.

It is an object of the present invention to provide a reel assembly including a measuring wire for the above-indicated purposes which shall overcome the disadvantages inherent in the devices heretofore used.

More specifically, it is a primary object of the invention to provide a device of the above-indicated character having all of the advantages of the devices previously used as regards accuracy and reliability, but which shall be much lighter and more compact and convenient to use and much less expensive to manufacture.

To these ends the measuring element of the device embodying the present invention is constituted by a wire of relatively small diameter, having distance markers secured thereto at suitable increments of length, so that the measuring element is of very light weight and is very compact when reeled up. A reel is provided which is especially adapted for receiving the wire when it is not in use, and the entire assembly is of the advantageous character above indicated.

The invention will be better understood, and other objects and advantages thereof will appear, from a consideration of the following detailed description of a preferred embodiment thereof, in conjunction with the accompanying drawings illustrating the same, in which:

Figure 1 is a side elevational view of a reel assembly embodying the said preferred embodiment of the invention;

Fig. 2 is a top plan view of the same;

Fig. 3 is a bottom plan view of the same;

Fig. 4 is a sectional view of the same taken on the normally vertical plane indicated by the line 4-4 in Fig. 2;

Fig. 5 is a rear elevational view of the same construction, except that a portion of a handle member included therein is broken away;

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Fig. 6 is an end elevational view of the same construction;

Fig. 7 is an enlarged, fragmentary, sectional view taken approximately on the plane indicated by the line 7-7 in Fig. 1; and

Figs. 8 and 9 are side views, taken at right angles to each other, of a short length of measuring wire with an attached distance marker, included in the aforesaid construction.

Referring to the drawings, the reel assembly illustrated therein comprises a frame including side walls 11 and 12 of plate form held in spaced, parallel relationship by spacing members 13, 13 of tubular form having screws 14, 14, extending therethrough and through aligned openings in the side walls 11 and 12, and cooperating nuts 15, 15. A wire receiving spool 16 is disposed between the side walls 11 and 12 and comprises side flanges 17 and 18 secured to opposite ends of a winding drum or core member 19 and to correspondingly spaced portions of a central shaft or axle 21, which may suitably be hollow as illustrated.

The ends of the spool axle 21 project beyond the side flanges 17 and 18 of the spool through openings in the respective side walls 11 and 12 of the frame in which the said axle is journaled, and the end portion extending through the opening in the frame side wall 12 is extended a sufficient distance to receive a crank arm 22 upon the outer end of which a suitable crank handle 23 is mounted.

A handle 24 for manual holding of the assembly comprises an inner portion 24a extending between projecting portions 11a and 12a of the frame side walls 11 and 12, respectively, and is clamped and securely held therebetween by screws 25, 25 and cooperating nuts 26, 26, the said screws extending through aligned openings in the side wall portions 11a and 12a and the handle portion 24a embraced thereby, as shown.

A measuring wire 27 is coiled upon the winding drum or core 19 of the spool 16, having its inner end suitably secured thereto as by having the said end bent into a hook extending into or through a suitable opening in the drum 19, as indicated at 27a in Fig. 4. The wire is preferably made of spring steel, such as piano wire, having a diameter of about 25 to 35 thousandths of an inch, although it may be more or less. As a specific example, a diameter of .033" has been found most satisfactory. A very considerable length of wire of this size can be coiled in a small space, and accordingly a spool of relatively small size will hold a great length thereof, on the order

of several hundred feet, as contemplated by the present invention.

The portion of the wire 27 beyond the portion which is coiled upon the spool 16 extends through a guide tube 28 which is secured to the frame of the device as by clamps 29 fastened to the frame by means of certain of the screws 14 and co-operating nuts 15. As shown, the inner end 28a of the guide tube 28 extends into the space between the side walls 11 and 12 of the frame to a point near the periphery of the reeled portion of the wire 27, being directed toward approximate tangency with the periphery of said reeled portion.

From its inner end 28a the tube 28 continues through a curved portion 28b passing over the outer edge of the frame side wall 11, thence through a substantially arcuate portion 28c adjacent the outer face of said side wall, and thence through a terminal portion 28d consisting of a relatively stiff coiled spring free at its outer end. It will be understood, of course, that the inner end of the spring 28d is suitably secured to the outer extremity of the solid portion of the tube 28, which may be made of suitable metal tubing loosely surrounding the wire 27 and certain distance markers secured thereto as described hereinafter. It will be seen that the terminal portion 28d of the guide tube is directed away from the plane substantially oppositely to the direction in which the handle 24 projects therefrom.

In the initial coiling of the wire 27 on the spool 16 the inner end of the wire may be threaded inwardly through the guide tube 28 from the open end of the spring portion 28d thereof and secured to the winding drum 19 as previously described. Substantially the entire length of the wire may then be reeled in on the spool by rotation of the hand crank by means of its handle 23, until the loop or swivel 31 at the outer end of the wire is drawn up to the open end of the spring portion 28d of the guide tube 28.

To facilitate the handling of the free end of the wire and the attachment thereof to auxiliary measuring tapes, fixed objects or the like, a snap fastener 31a is preferably linked with the outer ring of the swivel 31, and a leather thong 31b is tied to the snap fastener, as shown in Fig. 1.

In order to insure proper coiling and retention of the wire on the spool and also to introduce a certain amount of friction opposing overrunning of the spool, particularly following the feeding out of a partial length of the wire, there are provided a number of retaining members in the form of substantially V-shaped spring wires 32, 32, each having its apex secured as by welding, soldering, or other suitable means to one of the spacing members 13 of the reel frame and having its divergent free ends extending toward the axis of rotation of the spool and into the space between the side flanges thereof, preferably bearing resiliently against the inner faces of the said flanges.

Further and variable friction opposing rotation of the spool during unreeling and measuring operations is provided by a brake member in the form of a block 33 engaging the peripheries of the side flanges 17, 18 of the spool, as best shown in Fig. 4. This brake member may suitably be made of wood, fiber, rubber, or other material appropriate for frictional braking action on the spool flanges, which latter, of course, are ordinarily made of metal. The block 33 is secured to a lever arm 34 pivotally mounted upon one of the spacing members 13 of the reel frame assembly.

A tension spring 35 is connected between another one of the spacing members 13 and the lever arm 34 at a point thereon farther from its pivotal mounting than the mounting of the block 33 thereon, the spring conveniently extending through an opening 24b through the inner end portion 24a of the handle 24. Thus in the position shown, the brake member 33 is held resiliently against the peripheries of the spool flanges 17, 18 by the action of the spring 35 and provides frictional resistance against rotation of the spool. The resulting braking effect may, however, be varied over a wide range, or eliminated altogether, by manipulation of the free end portion 34a of the lever arm 34, which portion extends into proximity to the manually engageable portion of the handle 24.

The employment of the wire for measuring operations is provided for by the securing of distance markers 36, 36, best shown in Figs. 8 and 9, at suitable increments of length along the wire 27, such, for example, as every twenty-five feet. These markers are of sleeve form surrounding the wire 27 and are securely fixed thereto by any suitable means such as rolling, crimping, welding, or the like. The use of a sleeve rolling tool such as is commonly used for connecting abutting ends of telephone wires has been found very effective for securing the markers on the measuring wire with ample tightness to insure against accidental displacement.

The marker members are preferably made of relatively thin metal tubing, such as capillary tubing, of sufficient inside diameter to permit their being slid freely along the wire to the proper locations before being fixed in place. Thus they add little bulk to the wire when it is coiled up on the reel and do not interfere with the movement of the wire through the guide tube 28, which is of sufficient internal diameter to permit the marker members to pass therethrough without binding. The movement of the marker members through the guide tube or when in contact with obstructions encountered in the use of the wire for measuring purposes is further facilitated by making the said members with tapered ends 36a, 36a.

The distance measurement from a predetermined point on a particular marker 36 to a predetermined point adjacent the free end of the measuring wire 27, such as the inside of the outer loop of the snap fastener 31a, is preferably shown by a specific code marking on the marker, as indicated in Figs. 8 and 9 in the form of grooves or indentations 36b, 36b.

The entire length of the wire 27 is preferably covered with a suitable protective and insulating coating to afford protection of the wire against rust or other corrosion and against damage by abrasion, and likewise to afford protection against accidents which might otherwise result from contact of the wire with live electric wires. Such a coating may be made of a tough plastic insulating material, such as neoprene, polyethylene or vinyl plastics, etc., on the order of two to five thousandths of an inch thick.

Referring now to the mode of operation and use of the device embodying the invention, it will be appreciated that the wire 27 is very resilient and of course tends to spring out of coiled condition unless restrained. The guide tube 28 serves an important function in restraining the wire against undue displacement in the portion immediately beyond the portion which is coiled upon the spool 16, by introducing a substantial

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amount of friction opposing movement of the wire in either direction through the tube. Nevertheless the wire may be easily fed out through the tube by pulling on its outer end and may be retracted through the tube with like ease by means of the hand crank as previously described.

The positioning of the terminal portion 28d of the guide tube substantially in line with the handle 24 and in the opposite direction makes for ease and convenience in directing the outlet of the guide tube substantially along the length of the unreeled portion of the wire while the handle of the assembly is held in the hand of the operator. However, the resilient nature of the tube portion 28d allows a wide degree of latitude in the positioning of the assembly during both reeling and unreeling operations. This flexible guiding portion readily accommodates itself to the direction of approach or withdrawal of the wire and provides for smooth movements thereof, avoiding sharp bending and kinking of the same.

By the action of the spring wire retaining members 32, 32, the convolutions of the wire 27 on the spool 16 are retained between the side flanges thereof and are prevented from running over the edges of said flanges during the reeling and unreeling of the wire. In addition the retaining wires 32 provide an appreciable amount of friction opposing rotation of the spool 16, thus preventing overrunning of the spool upon cessation or slowing of the rate of pulling the wire out from the reel. The resilient nature of the retaining wires 32 insures proper functioning thereof, regardless of lateral irregularities in the side flanges 17, 18 of the spool.

Particularly during unreeling of the wire 27, the operator may press the lever arm 34 upwardly toward the handle to increase the friction between the braking member 33 and the side flanges 17, 18 of the spool to any desired extent. Also, the friction may be increased up to a point where the spool is in effect locked in the frame as may be desired when putting tension on the wire during measuring operations. Alternatively, and especially when the wire is being reeled in, the braking effect may be lessened or eliminated altogether by the operator pressing downwardly on the free end 34a of the lever arm 34, thus partially or completely overcoming the effect of the spring 35 and the resultant effect of the braking member 33. The variable braking effect is therefore utilized primarily to prevent overrunning of the spool and to impart the desired degree of tension to the wire under all conditions.

If desired, the braking member 33 may be arranged to bear upon the outer convolutions of the wire 27 on the spool 16 rather than upon the spool flanges 17, 18, in which event, of course, a suitable range of movement will be provided for the lever arm 34 so that the braking member will be able to follow the decreasing diameter of the coils of wire on the spool as any desired lengths of the wire are unreeled.

The use of the measuring wire is not limited to measurements coinciding with the lengths indicated by the distance markers 36, 36. Assuming by way of example that the markers are secured to the wire at increments of twenty-five feet of length, it will be readily understood that measurements of distances other than multiples of twenty-five feet may be made by using in conjunction with the measuring wire and attached to the free

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end thereof any conventional twenty-five-foot measuring tape graduated in such smaller units of length as may be involved in the desired measurement.

It will be apparent from the foregoing that the present invention involves important advantages over the prior art by reason of its achievement of the objects hereinbefore indicated.

While only one specific embodiment of the invention has been illustrated and described herein, it will be readily understood by those skilled in the art that various changes and modifications may be made in the details of construction and arrangement of parts without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed as new and is desired to be secured by Letters Patent, therefore, is:

1. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, and retaining means secured to said frame and extending into the space between the side flanges of the spool adjacent the inner faces thereof and across substantially the entire width of said space to prevent said flexible element from running over the edges of said flanges.

2. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, and retaining means secured to said frame and extending into the space between the side flanges of the spool and into contact with the inner faces thereof to prevent said flexible element from running over the edges of said flanges.

3. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, and resilient retaining means secured to said frame and extending into the space between the side flanges of the spool and into resilient bearing contact with the inner faces thereof to prevent said flexible element from running over the edges of said flanges and to exert a braking effect upon the rotation of said spool during reeling and unreeling operations thereof.

4. A reel assembly comprising a frame having parallel spaced side walls and spacing members secured between said walls and holding the same in such spaced relationship, a spool disposed between said walls and journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, and resilient retaining members secured to at least some of said spacing members and extending into the space between the side flanges of the spool and into resilient bearing contact with the inner faces thereof to prevent said flexible element from running over the edges of said flanges.

5. A reel assembly comprising a frame having parallel spaced side walls and spacing members secured between said walls and holding the same in such spaced relationship, a spool disposed between said walls and journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, and resilient retaining members in the form of substantially V-shaped spring wires having their apices secured to at least some of said spacing members and having their free ends extending into the space between the side flanges

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of the spool and into resilient bearing contact with the inner faces thereof to prevent said flexible element from running over the edges of said flanges.

6. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, a guide tube loosely surrounding a portion of the length of said flexible element beyond the portion thereof reeled upon said spool, said guide tube being secured to said frame, having its inner end directed toward approximate tangency with the periphery of the reeled portion of said flexible element and extending substantially arcuately to a point of external delivery and retraction of said element so as to have frictional engagement with said element to restrain free movement thereof through said guide tube, and braking means acting upon said spool to restrain free rotation thereof.

7. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, a guide tube loosely surrounding a portion of the length of said flexible element beyond the portion thereof reeled upon said spool, said guide tube being secured to said frame and extending substantially arcuately from a point near the periphery of the reeled portion of said flexible element to a point of external delivery and retraction of said element so as to have frictional engagement with said element between said points to restrain free movement of said element through said guide tube, said guide tube also having a flexible terminal portion free at its outer end adjacent the said point of external delivery and retraction of said element, and braking means acting upon said spool to restrain free rotation thereof.

8. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, a guide tube loosely surrounding a portion of the length of said flexible element beyond the portion thereof reeled upon said spool, said guide tube being secured to said frame and extending substantially arcuately from a point near the periphery of the reeled portion of said flexible element to a point of external delivery and retraction of said element so as to have frictional engagement with said element between said points to restrain free movement of said element through said guide tube, said guide tube also having a terminal portion adjacent the said point of external delivery and retraction of said element comprising a relatively stiff coiled spring free at its outer end, and braking means acting upon said spool to restrain free rotation thereof.

9. A reel assembly comprising a frame, a spool journaled with respect thereto, a handle secured to the frame and projecting therefrom in a direction transverse to the axis of rotation of the spool, an elongated flexible element adapted to

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be reeled upon said spool and unreeled therefrom, a guide tube loosely surrounding a portion of the length of said flexible element beyond the portion thereof reeled upon said spool, said guide tube being secured to said frame and extending from a point near the periphery of the reeled portion of said flexible element to a point of external delivery and retraction of said element, terminating in a portion directed away from said frame substantially oppositely to the direction in which said handle projects therefrom, and being formed to have frictional engagement with said element between said points to restrain free movement of said element through said guide tube, and braking means acting upon said spool to restrain free rotation thereof.

10. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, a guide tube loosely surrounding a portion of the length of said flexible element beyond the portion thereof reeled upon said spool, said guide tube being secured to said frame and extending substantially arcuately from a point near the periphery of the reeled portion of said flexible element to a point of external delivery and retraction of said element so as to have frictional engagement with said element between said points to restrain free movement of said element through said guide tube, and means acting upon said spool to restrain free rotation thereof, said means comprising braking means of substantially constant effectiveness.

11. A reel assembly comprising a frame, a spool journaled with respect thereto, an elongated flexible element adapted to be reeled upon said spool and unreeled therefrom, a guide tube loosely surrounding a portion of the length of said flexible element beyond the portion thereof reeled upon said spool, said guide tube being secured to said frame and extending substantially arcuately from a point near the periphery of the reeled portion of said flexible element to a point of external delivery and retraction of said element so as to have frictional engagement with said element between said points to restrain free movement of said element through said guide tube, and means acting upon said spool to restrain free rotation thereof, said means comprising braking means of variable effectiveness.

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