July 20, 1943. G. E. LOFGREN 2,324,711

CORD-WINDING DEVICE

Original Filed Dec. 12, 1940 2 Sheets-Sheet 1

Fig. 2.

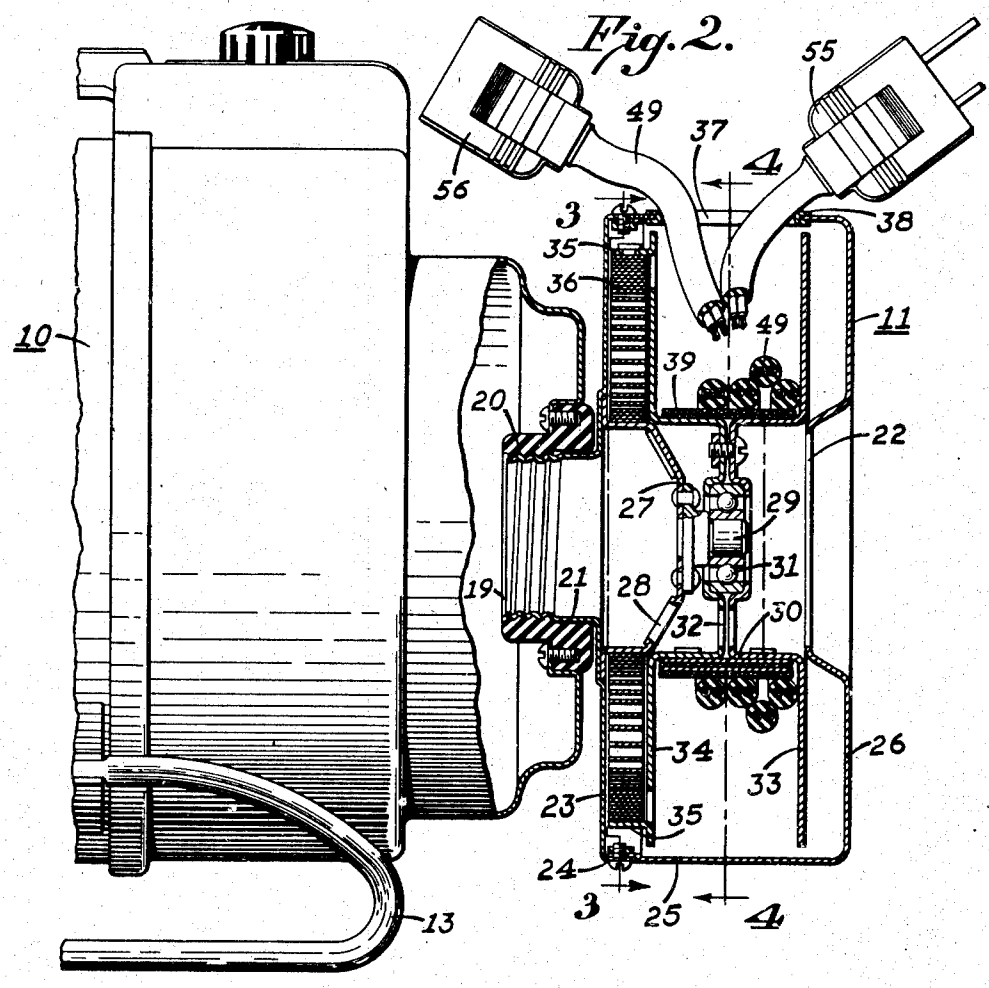
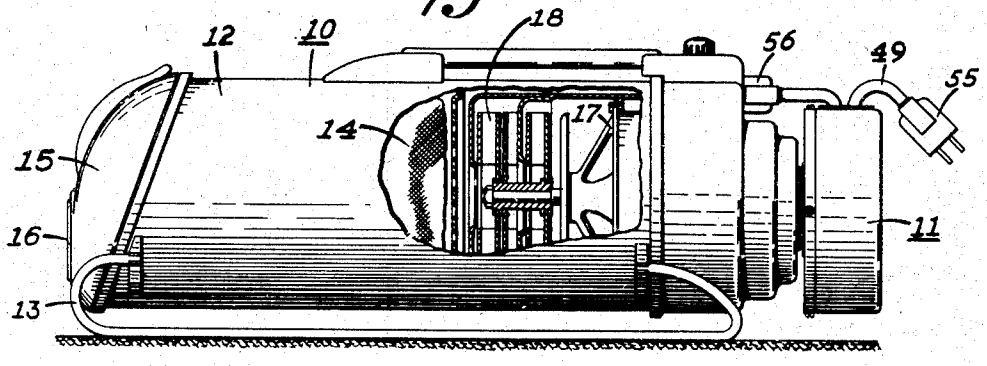


Fig. 1.



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Fig. 3.

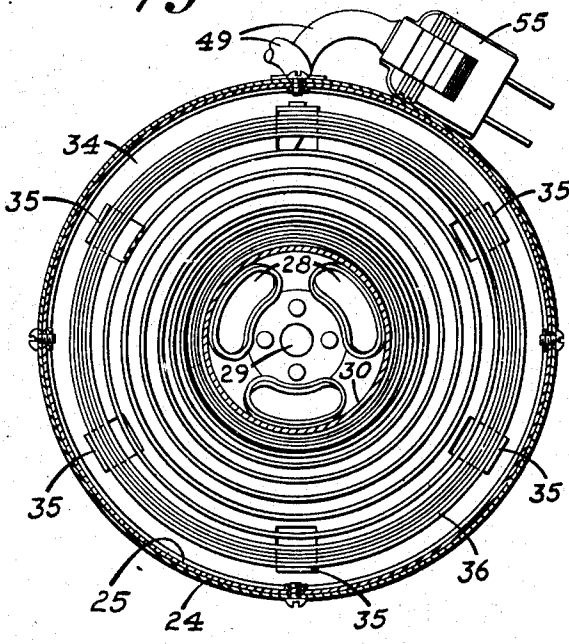


Fig. 4.

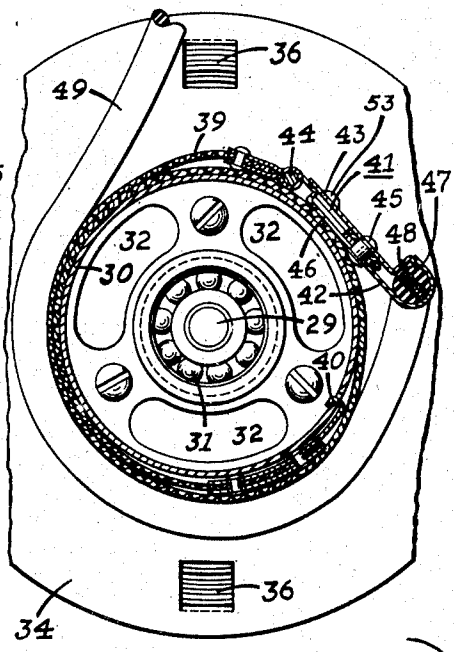


Fig. 5.

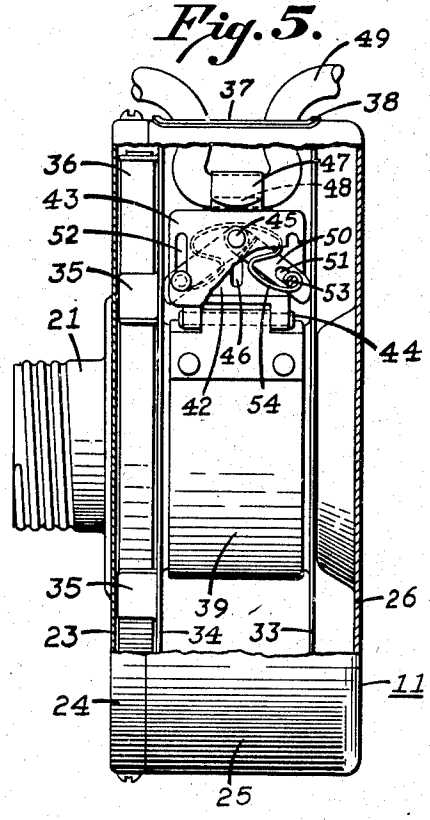
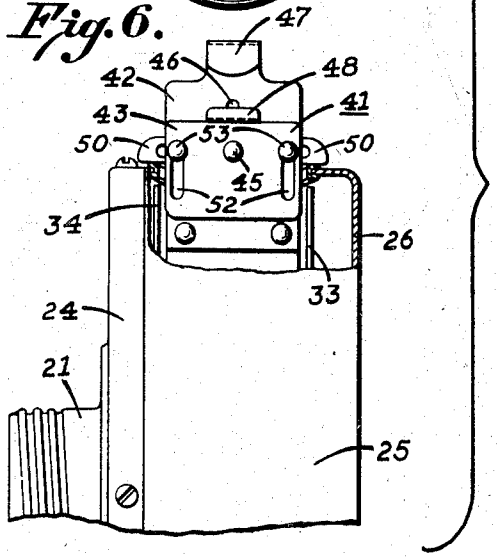




Fig. 6.



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UNITED STATES PATENT OFFICE

2,324,711

CORD-WINDING DEVICE

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Original application December 12, 1940, Serial No. 369,765. Divided and this application May 8, 1941, Serial No. 392,405

16 Claims. (Cl. 242—107)

This application is a division of my co-pending application, Serial No. 369,765, filed December 12, 1940.

My invention relates to a cord-winding device, and more particularly to a device of this type which eliminates the necessity of slip rings or other relatively movable current-carrying parts in a cord-winding device. Further objects and advantages of my invention will be apparent from the following description considered in connection with the accompanying drawings which form a part of this specification, and of which:

Fig. 1 is a side view, partially in cross section, of a device in accordance with my invention secured to a vacuum cleaner;

Fig. 2 is a view on an enlarged scale of a portion of the apparatus illustrated in Fig. 1, the cord-winding device and a portion of the vacuum cleaner being in cross section;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a cross-sectional view of the cord-winding device showing the cord entirely unwound, but still attached to the reel of the device; and

Fig. 6 is a view similar to Fig. 5, but with the cord detached from the reel.

Referring to the drawings, reference character 10 designates generally a vacuum cleaner unit, while reference character 11 designates the cord-winding device. The vacuum cleaner unit includes a casing 12 provided with runners 13 for supporting the unit horizontally upon a horizontal surface. A dust-separating member 14 is located within the casing and may be removed for emptying through an opening in one end of the casing which is closed by means of a removable cover member 15. Member 15 is provided with an inlet opening 16 to which may be connected a conduit leading to a suction nozzle or other dusting tool. Also located within the casing is an electric motor 17 driving a centrifugal fan 18. Rotation of the fan serves to cause a flow of air into the casing through opening 16. This air passes through the material of the dust-separating member 14 to the fan and flows therefrom through the electric motor and is discharged from the casing through an exhaust opening 19, shown in Fig. 2.

The exhaust opening is provided with any suitable coupling means, whereby if desired a hose may be connected thereto for using the cleaner as a blower. As shown, this coupling means consists of screw threads 20. The cord-winding device 11 is provided with a hollow member 21 which is provided with screw threads adapted to engage the threads 20. The interior of the device 11 is hollow and the air discharged from the exhaust opening 19 passes through an opening 22 therein to the atmosphere. Obviously, the opening 22 could be provided with screw threads, or other suitable coupling means, so that the hose could be connected thereto for blowing.

The hollow member 21 is secured to or integral with a circular end wall 23. This wall is provided with a flange 24 to which is bolted a cylindrical wall 25. Member 25 is secured to or integral with another end wall 26 in which is formed the opening 22. Walls 23, 25 and 26 form the case of the cord-winding device.

Suitably secured to the end wall 23 is a spider 27 formed with a plurality of apertures 28 therethrough in order to permit air to flow through the central portion of the case. A spindle 29 is supported by spider 27 and a reel 30 is rotatably mounted thereon by means of a ball bearing 31. The hub portion of the reel is provided with openings 32 in order to permit flow therethrough of air. The reel includes spaced cord-retaining flanges 33 and 34. A plurality of lips 35 are struck from near the periphery of flange 34 and the outer end of a spiral spring 36 is riveted to one of these lips. The remaining lips serve to retain the outermost turn of the spring when the spring is completely unwound. The inner end of the spring is suitably secured to the spider 27.

The cylindrical wall 25 is formed with an opening 37 around the edges of which is preferably provided a gasket 38 of rubber or the like. The dimension of the opening 37 in axial direction is substantially the same as the distance between the reel flanges 33 and 34.

A strap member 39 has one end secured to the hub of reel 30, as by being provided with a hook 40 engaging an opening formed in the hub. The strap is of such length as to permit of its being wound about two turns around the hub and the other end of the strap is secured to a cord-retaining clamp designated generally by reference character 41. This clamp includes a pair of parallel plate-like members 42 and 43. Member 42 is pivotally secured to the end of the strap by means of a pin 44. A rivet or the like 45 is rigidly secured to plate 43 and engages a slot 46 formed in plate 42, whereby the plates may be slid relative to each other in a direction parallel to the slot 46. Plate 42 is formed with a hook-like member 47 which co-operates with a projec-

tion 48 formed on plate 43 to clamp therebetween an electric cord 49 when the plates are in the position shown in Figs. 4 and 5. When the plates are slid relative to each other to the position shown in Fig. 6, sufficient space is provided between the hook 47 and the projection 48 to remove the cord.

Two arms 50 are pivoted on the rivet 45 and each arm is provided with a slot 51 adjacent to its outer end. Plate 43 is provided with a slot 52 near either edge and pins or the like 53, which are fixed to plate 42 as by riveting, extend through the slots 51 in the arms and the slots 52 in plate 43. Pins 53 are engaged by a spring 54, the midpoint of which passes over the rivet 45. The tendency of spring 54 is to move the pins 53 through the slots 52 from the position shown in Fig. 5 to that illustrated in Fig. 6. Such movement of the pins 53 causes the arms 50 to pivot about the rivet 45 so that the ends of the arms project beyond the sides of the cord clamp 41, the slots 51 in the arms permitting such pivoting. Inasmuch as pins 53 are secured to plate 42, the pins can move in this manner only when the plate 42 is slid upwardly with respect to plate 43. When the parts are in the position shown in Fig. 5 the pull of the cord on hook 47 cannot slide the plate 42 upwardly relative to plate 43, inasmuch as the pins 53 engage the slots 51 in arms 50 and the latter cannot pivot upwardly about rivet 45 because their outer ends are restrained by flanges 33 and 34 of the reel. Hence, the cord cannot be accidentally released while the clamp 41 is within the case. However, when the clamp is pulled through the opening 37, the arms 50 are free to pivot outwardly and hence the plate 42 may be slid upwardly with respect to plate 43 to the position shown in Fig. 6 in order to release the cord. Spring 54 acting on pins 53 tends to slide the plates apart and is aided by the pull of the cord on hook 47.

The above-described device operates as follows. The cord 49 is initially wound on the spool 30 with the ends of the cord extending through the opening 37. The plugs 55 and 56 are sufficiently large so that they will not pass through this opening. To unwind the cord, the plugs 55 and 56 are grasped and the cord is pulled outwardly through the opening 37. This causes the reel 30 to rotate and wind up the spring 36. The cord is thus pulled out through the opening until it is completely unwound from the reel. When this occurs, the cord-holding clamp attached to the end of strap 39 is likewise pulled through the opening. The pull of the cord on the hook 47, together with the force exerted by spring 54 is now able to move the parts to the position shown in Fig. 6, where the arms extend beyond the edges of the opening 37 and thus prevent the retraction of the clamp into the casing by the force exerted by the spring 36. In this position the plate 42 has been slid upwardly with respect to the plate 43 so as to release the cord from the hook 47. With the parts in this position, which is illustrated in Fig. 6, the arms 50 cannot be accidentally retracted to within the clamp inasmuch as the pins 53 prevent downward pivoting of the arms as long as plate 42 is slid upwardly with respect to plate 43.

The plug 56 of the cord may then be inserted in a suitable receptacle of the vacuum cleaner unit, while the plug 55 may be connected to a convenient outlet.

When it is desired to again wind the cord, the central part thereof is placed underneath the hook 47, the clamp 41 is pulled outwardly a slight distance to permit pivoting of the arms, and the plate 42 is slid downwardly so as to clamp the cord in place and to retract the arms sufficiently so that they will pass through the opening 37. Sliding of the plate 42 downwardly with respect to plate 43, causes such retraction due to the engagement of the pins 53 with the slots 51 in the arms. The spring 36 thereupon causes the spool 30 to rotate and thus wind the cord upon the hub and between the flanges 33 and 34.

It will thus be seen that I have provided a cord reel which may be easily attached to a standard vacuum cleaner unit and which requires no movable current-carrying contacts, such as slip rings or the like. In addition, since the cord is wound by engaging the center part, winding both ends at the same time, it only requires half the revolutions to wind the cord completely, and so a smaller spring may be used than if the cord were wound from one end only. While I have shown and described one more or less specific embodiment of such a device in accordance with my invention, it is to be understood that this has been done for purposes of illustration only and is not to be considered as limiting the scope of my invention, which is to be determined by the appended claims.

What I claim is:

1. In a cord-winding device, stationary structure, a reel rotatably mounted thereon, a spring secured to said structure and to said reel so as to be stressed by rotation of the latter, means cooperating with said reel and said structure for selectively restraining rotation of the reel relative to said structure by the stressed spring and releasing the reel for rotation, a cord, means connected to said reel operable to secure said cord to said reel and to release it therefrom, and means for preventing the second-mentioned means from releasing the cord when the first-mentioned means has released the reel for rotation.

2. In a cord-winding device, stationary structure, a reel rotatably mounted thereon, a spring secured to said structure and to said reel so as to be stressed by rotation of the latter, means cooperating with said reel and said structure for selectively restraining rotation of the reel relative to said structure by the stressed spring and releasing the reel for rotation, a cord, means connected to said reel operable to secure said cord to said reel and to release it therefrom, and means for preventing the first-mentioned means from releasing the reel for rotation when the second-mentioned means is in cord releasing position.

3. In a cord-winding device, stationary structure, a reel rotatably mounted thereon, a spring secured to said structure and to said reel so as to be stressed by rotation of the latter, means cooperating with said reel and said structure for selectively restraining rotation of the reel relative to said structure by the stressed spring and releasing the reel for rotation, a cord, means connected to said reel operable to secure said cord to said reel and to release it therefrom, and means for preventing the second-mentioned means from releasing the cord when the first-mentioned means has released the reel for rotation and for preventing the first-mentioned means from releasing the reel for rotation when the second-mentioned means is in cord releasing position.

4. In a cord-winding device, a case, a reel ro-

tatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp including elements movable with respect to each other to release a cord therefrom, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, an automatically extendable and manually retractable member for preventing passage of said clamp inwardly through said aperture when said member is extended, and means for maintaining the last-mentioned member in extended position when said elements are in the position releasing the cord.

5. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp including elements movable with respect to each other to release a cord therefrom, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, a pair of arms pivoted on said clamp and pivotal from a retracted position in which the clamp may pass through said aperture to an extended position in which the arms project beyond the edges of said aperture, resilient means for urging said arms to the extended position, and means for maintaining said arms in said extended position when said elements are in the position releasing the cord.

6. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, automatically extendable and manually retractable means carried by said clamp for preventing retraction of said clamp through said aperture when said means is extended, means accessible for operation only when said clamp is outside said case to release a cord from said clamp, and means for maintaining said automatically extendable and manually retractable means in extended position when said clamp is in cord releasing position.

7. In a cord-winding device, a case, a reel rotatably mounted within said case and including a hub portion and a pair of axially spaced radially extending flanges, a spiral spring having one end secured to said case and the other end to one of said flanges, said case being formed with an aperture in radial alignment with said reel, said aperture having a length in axial direction substantially equal to the axial spacing of said flanges, a cord clamp, a flexible member for securing said clamp to said hub and having sufficient length so that the clamp may be pulled out through said aperture, a pair of arms pivoted on said clamp and pivotal from a retracted position in which the clamp may be accommodated between said flanges and pass through said aperture to an extended position in which the arms project beyond the ends of said aperture, and resilient means for urging the arms to the extended position when the clamp is pulled out through said aperture, said flanges serving to retain said arms in retracted position when the clamp is within said case.

8. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, said clamp including a pair of elements slidable with respect to each other to open and close the clamp, a pair of arms pivoted on one of said elements and pivotal from a retracted position in which the clamp may pass through said aperture to an extended position in which the arms project beyond the edges of said aperture, and resilient means for urging said arms to the extended position.

9. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, said clamp including a pair of elements slidable with respect to each other to open and close the clamp, a pair of arms pivoted on one of said elements and pivotal from a retracted position in which the clamp may pass through said aperture to an extended position in which the arms project beyond the edges of said aperture, resilient means for yieldably urging said arms to the extended position, and means carried by the other of said elements for preventing pivoting of said arms to the retracted position when said elements are slid to the position opening the clamp.

10. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, said clamp including a pair of elements slidable with respect to each other to open and close the clamp, a pair of arms pivoted on one of said elements and pivotal from a retracted position in which the clamp may pass through said aperture to an extended position in which the arms project beyond the edges of said aperture, resilient means for yieldably urging said arms to the extended position, and means carried by the other of said elements for preventing sliding of said elements to the position opening said clamp when said arms are in retracted position.

11. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, said clamp including a pair of elements slidable with respect to each other to open and close the clamp, a

pair of arms pivoted on one of said elements and pivotal from a retracted position in which the clamp may pass through said aperture to an extended position in which the arms project beyond the edges of said aperture, resilient means for yieldably urging said arms to the extended position, and means carried by the other of said elements for preventing pivoting of said arms to the retracted position when said elements are slid to the position opening the clamp and for preventing sliding of said elements to the position opening said clamp when said arms are in retracted position.

12. In a cord-winding device, a case, a reel rotatably mounted within said case, a spring having one end secured to said reel and the other end secured to said case, said case being formed with an aperture in radial alignment with the periphery of said reel, a cord-securing clamp, a flexible member for securing said clamp to said reel of sufficient length so that said clamp may be pulled out through said aperture, said clamp including a pair of elements slidable with respect to each other to open and close the clamp, a pair of arms disposed between said elements and pivoted on one of the elements, a resilient member tending to pivot said arms from a retracted position in which the clamp may pass through said aperture to an extended position in which the arms project beyond the edges of said aperture, and members carried by the other of said elements and engaging slots formed in said arms whereby pivoting of said arms and sliding of said elements independently of each other is prevented.

13. In a cord-winding device, a casing, a cover for the casing permanently secured thereto, a reel rotatably mounted in said casing, a cord, an electrical connector affixed to each end of said cord, said casing being formed with an aperture in radial alignment with said reel and of sufficient size to accommodate the cord double but smaller than said connectors, means for releasably securing the center of said cord to said reel comprising a member portion secured to the reel and a member portion connected to the first portion bearing cord holding means, means biasing said cord holding means into a position within said casing, releasable means for holding said cord holding means outside of said casing, and means for rotating said reel and winding said cord double through said aperture on said reel from the center of the cord toward both ends when the center of the cord is connected to the cord holding means and the last mentioned releasable means is released.

14. In a cord-winding device, a casing, a cover for the casing permanently secured thereto, a reel rotatably mounted in said casing, a cord, an electrical connector affixed to each end of said cord, said casing being formed with an aperture in radial alignment with said reel and of sufficient size to accommodate the cord double but smaller than said connectors, flexible means secured at one end to said reel and having means releasably securable to the mid point of said cord at its other end, said flexible means being of a size to pass through said aperture, releasable means for holding said cord holding means outside of said casing, means for releasing said last mentioned releasable means when said cord holding means is in cord-retaining position, means including a spring that is connected at one end to said casing and at its other end to said reel and that is stressed in a direction tending to rotate the reel when said cord holding means is outside of said casing for winding said cord double through said aperture on said reel from the midpoint of the cord toward both ends when the midpoint of the cord is connected to the cord holding means.

15. A cord-winding device comprising a first member, a second member rotatably mounted thereon, a spring connected to both members, said spring being stressed by relative rotation of the members, releasable means for preventing relative rotation of the members, means to releasably secure a cord to one of said members, and means interlocking said first and second mentioned means to prevent both from being in the releasing position simultaneously.

16. A cord-winding device comprising a casing and a cord reel rotatably mounted therein, a flexible member always in normal operation of the device wrapped around said reel at least a fraction over one turn, means engaging said reel and one end of the flexible member to prevent relative movement therebetween in the wrapping direction and releasable only by a relative motion therebetween having a radial component, means on the other end of said member for releasably engaging a cord and for releasably engaging the casing, said member being long enough for the last-mentioned means to engage the casing in normal operation of the device and wide enough to assure its overlying the means on the end of the flexible member for engaging the reel and thereby preventing disengagement thereof during normal operation of the device, and spring means for producing relative rotation of the casing and reel in a direction to wrap on the reel a cord engaged by the means on the end of the flexible member in the same direction the flexible member is wrapped on the reel.

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