

May 26, 1953

J. H. SMITH
WIRE PACKAGE

2,639,873

Original Filed Feb. 24, 1945

2 Sheets-Sheet 1

Fig. 1.

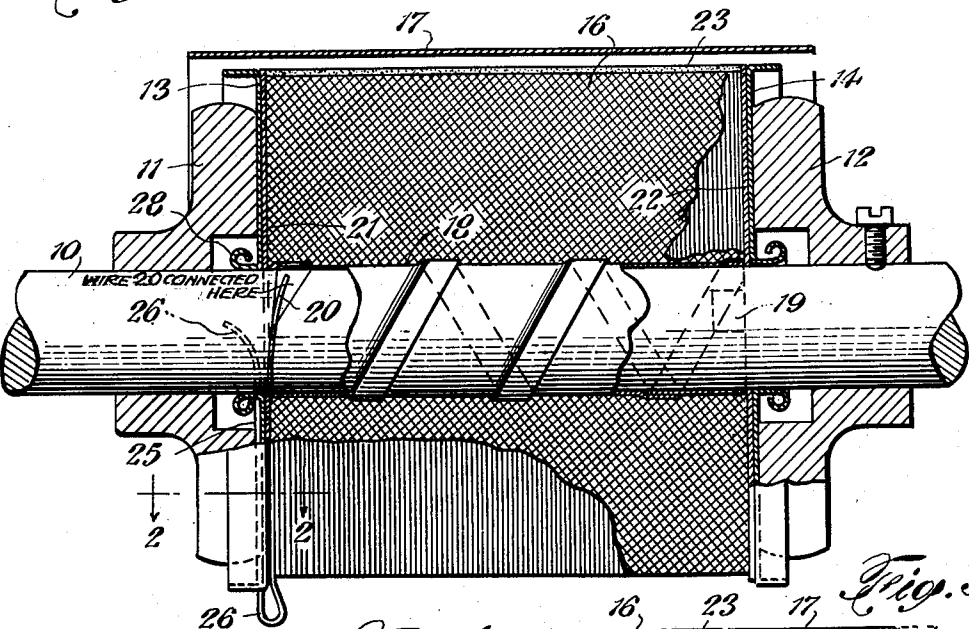


Fig. 2.

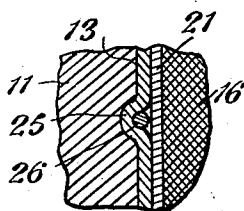


Fig. 4.

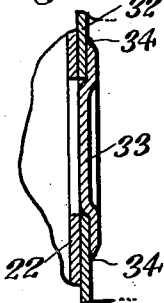


Fig. 3.

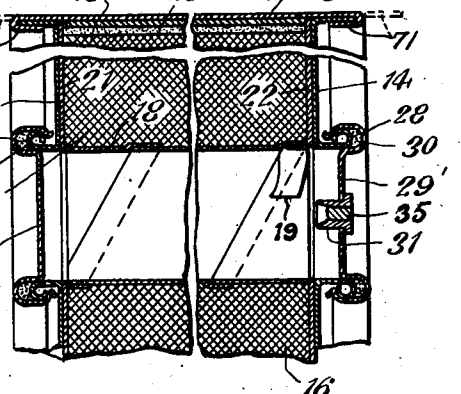


Fig. 5.

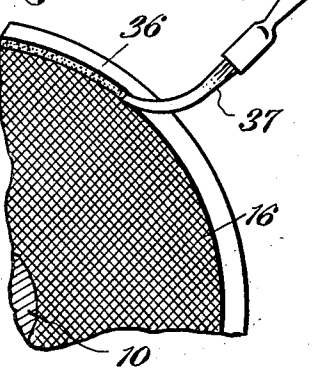
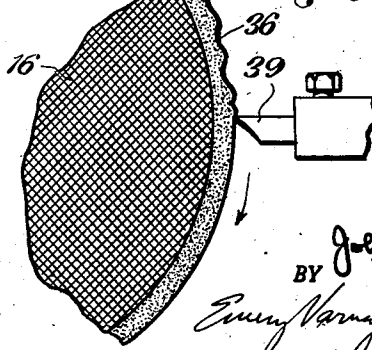


Fig. 6.



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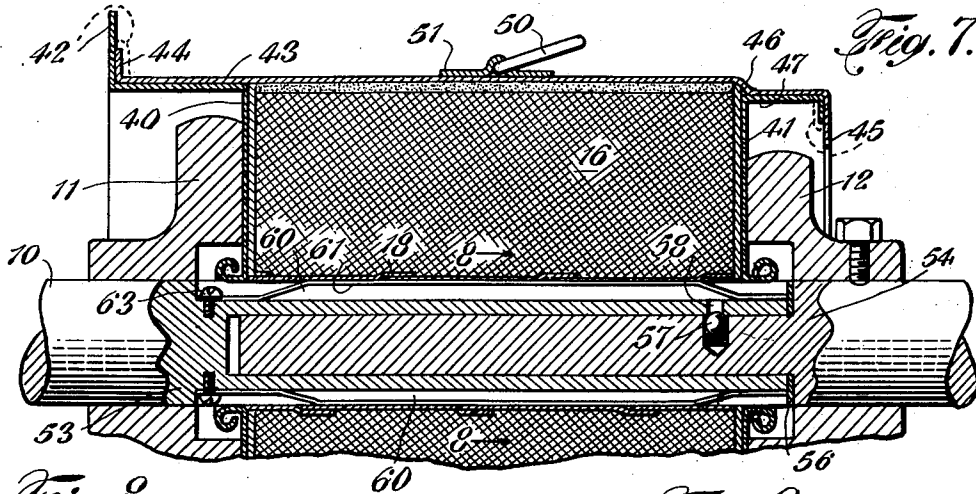
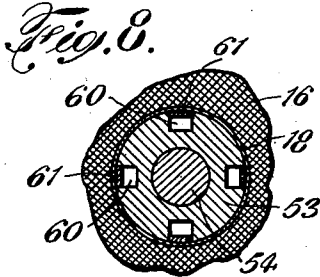
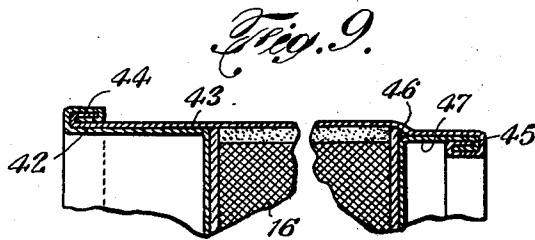
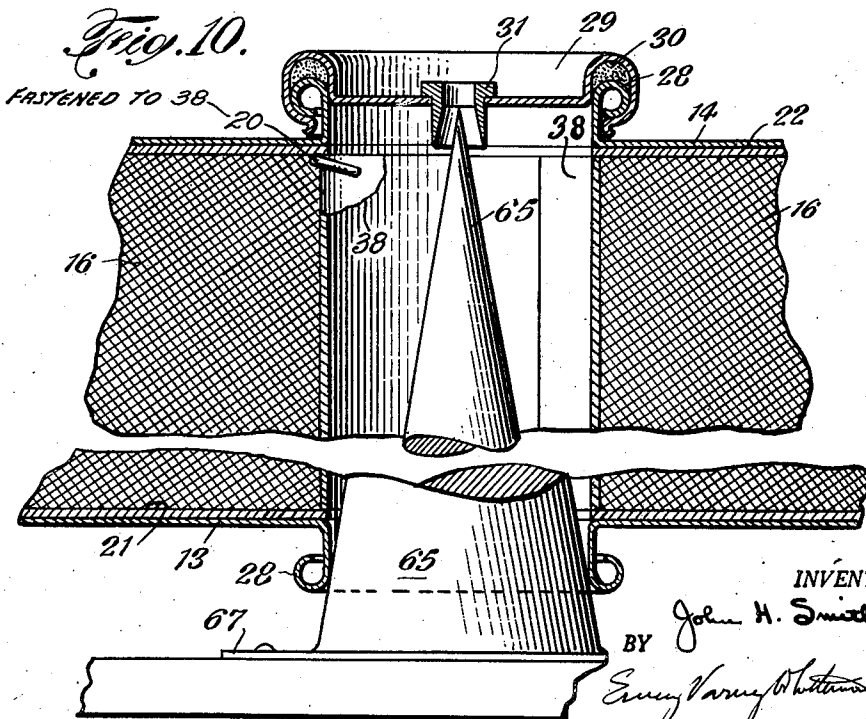
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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WIRE PACKAGE

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Original application February 24, 1945, Serial No. 579,654, now Patent No. 2,457,094, dated December 21, 1948. Divided and this application August 5, 1947, Serial No. 766,215.

8 Claims. (Cl. 242-159)

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This invention relates to a wire container and package in which the wire is wound in a coil in such relation to the container that the wire can be payed out from the inside of the coil.

This application is a division of my application Serial No. 579,654, filed February 24, 1945, now Patent No. 2,457,094 of December 21, 1948, which claims the method of packaging wire disclosed herein.

An object of the invention is to provide an improved package or container for wire. In place of the conventional spool this invention employs a can or similar package and, in so doing, obtains better production for the wire with a container that is lighter than the customary spool.

An object of the invention is to provide an improved wire package formed by constructing a container around a coil of wire while the wire remains on the supporting means on which the coil was wound. The supporting means are removed after the container has been constructed.

In accordance with one feature of the invention the wire is wound around a mandrel and between annular discs that are backed up and reinforced by flanges on the mandrel during the winding operation. After the coil has been wound to a predetermined diameter it is covered by a cylindrical shell that is connected to the annular discs so as to form a can that comprises the container or package for the coil of wire.

Other features relate to the lining of the container and to the form and correlation of the end discs and connecting shell for obtaining strong and tight rolled-over seams that secure the end discs to the cylindrical shell.

Spools have end flanges held together by a drum on which the wire is wound and these flanges must be rigid and heavy enough to support the wire firmly and to prevent bending of their outer rim portions. With this invention the discs that take the place of the end flanges need not be made of such heavy material because they are braced by the mandrel flanges against bending during the winding of the coil and in the completed package their outer edges are connected together and supported by a cylindrical cover that forms the body or side of the can or container. The saving in the weight of the end flanges more than makes up for the fact that the cylindrical cover around the outside of the coil is larger than the drum of a spool. Moreover, the cover on the outside of the wire affords protection for the wire that is not obtained with the usual lagging or protective wrap employed with a spool.

For those types of wire that have insulation which deteriorates with continued exposure to the

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air the package of this invention can be provided with covers and tightly sealed to prevent such exposure of the insulation while the wire is being shipped and while it is being held by a jobber, retailer, or customer prior to its use.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawings, forming a part hereof, in which illustrative embodiments of the invention are shown and in which like reference characters indicate corresponding parts in all the views:

Figure 1 is a view partly in elevation, but mostly in longitudinal section, illustrating the manner in which a coil of wire is wound on a mandrel between end discs in accordance with this invention.

Figure 2 is a fragmentary sectional view taken on the line 2-2 of Figure 1.

Figure 3 is a fragmentary, longitudinal sectional view of the coil of Figure 1 after the package has been completed and the mandrel removed.

Figure 4 is a fragmentary sectional view showing a modified construction for one end of the wire container illustrated in Figure 3.

Figure 5 is a fragmentary, transverse sectional view illustrating the application of padding or lining material to the outside of the completed coil.

Figure 6 is a view similar to Figure 5, but illustrating a subsequent step in which the padding material is reduced to a uniform diameter.

Figure 7 is a longitudinal sectional view, partly broken away, showing a modified form of the invention that is particularly suitable for coils of larger size, and showing the construction of the mandrel on which the coil is wound.

Figure 8 is a sectional view taken on the line 8-8 of Figure 7.

Figure 9 is a detail sectional view showing the ends of the cylindrical shell of Figure 7 after they have been turned over to seal the package.

Figure 10 is a sectional view showing the invention with a center cone for holding the container and for controlling the wire as it is drawn out of the container.

Figure 1 shows a mandrel 10 with spaced flanges or end plates 11 and 12. One or both of the flanges 11 and 12 are detachable from the mandrel 10, and conveniently the distance between them can be adjusted so that the mandrel is suitable for winding coils of different lengths. Annular discs 13 and 14, which are to form the ends of the can in which the coil of the wire is to be enclosed, are located on the mandrel 10 and against the confronting faces of the flanges 11 and 12.

The end discs 13 and 14 desirably are of light gauge sheet metal and of somewhat larger diameter than the flanges 11 and 12. The thickness of the sheet metal parts is exaggerated in the drawing for clearer illustration. The flanges 11 and 12 back up the end discs 13 and 14 and prevent these discs from bending during the winding of the coil.

Between the end discs 13 and 14 a coil of wire 16 is wound about the mandrel 10 until the diameter of the coil 16 reaches a predetermined value. This diameter will be somewhat less than the diameter of the end discs 13 and 14 because the outer edges of these end discs are not held against bending by the flanges 11 and 12. It is necessary to have the end discs 13 and 14 extend somewhat beyond the outer edges of the flanges 11 and 12 in order to permit attachment of the rims of the end discs to a cylindrical shell 17 that forms the side of the final package.

It is advantageous to have the opening through the inside of the coil 16 slightly larger than the openings through the end discs 13 and 14 so that the turns of the coil 16 are held against displacement across the entire end faces of the coil. In order to increase the diameter of the opening through the coil 16 a wrapping 18 is placed around the mandrel 10 between the end discs 13 and 14 prior to winding the coil of wire 16, this wrapping serving as a lining for the coil of wire. This wrapping is preferably made of paper or other soft material that serves as padding for preventing the wire from coming in contact with the surface of the mandrel 10. This wrapping 18 may be wound as a helix from strips of paper, or other material, having pointed ends that are cut to the necessary angle for winding around the mandrel 10 without leaving any of the surface of the mandrel exposed. When the wrapping 18 is wound as a helix it is preferably provided with a pulling tab 19 at the beginning of the helix which is accessible from the hollow center of the coil after the mandrel has been removed. When the package is ready for use the wrapping 18 can be conveniently removed by gripping this tab and pulling. The inner end 20 of the wire is preferably connected with the end of the helical wrapping remote from the tab 19 so that it will be drawn out with the wrapping 18.

Instead of winding the wrapping 18 around the mandrel as a helix this wrapping may be a paper tube split longitudinally in such a manner that the tube can be collapsed and extracted from the center of the coil in the final package. This construction is illustrated in Figure 10, the split tube being designated 38. As illustrated, the inside diameter of the split tube 38 is equal to the diameter of the central openings through the end discs 13, 14. When using a collapsible tube the lead end 20 of the wire is preferably fastened to the tube so that it will be drawn out with the tube when the tube is collapsed and withdrawn.

The wrapping 18 may also be made up of a sheet of paper, or other suitable material, having a width equal to the length of the mandrel that is to be covered. This sheet is wrapped around the mandrel a number of times to obtain the desired thickness of padding. In this case the lead end of the wire is fastened to the lead end of the sheet in such a manner that it is interleaved between the successive layers of paper as the sheet is wrapped around the mandrel. This construction causes the lead end of

the wire to come out of the center of the coil with the paper when the latter is twisted out of the coil.

In the preferred construction, padding or lining material is provided between the ends of the wire coil and the end discs 13 and 14, and also between the outside of the coil and cylindrical shell 17. The lining for the ends of the container comprises annular discs 21 and 22 which may be made of paper and placed against the end discs 13 and 14 before the coil is wound on the mandrel. The openings through the centers of the discs 21 and 22 are substantially equal to the diameter of the mandrel 10, and these discs are held apart and against the end discs 13 and 14 by the wrapping 18 applied before the coil is wound.

After the coil is completed, its outside may be covered with a wrapping of sheet material 23, for example corrugated paper, that serves as a lining for the side wall of the container and fills up the space left by the difference in the diameters of the coil 16 and of the end discs 13 and 14.

If the wire package is to be used for paying out wire in series with other similarly packaged coils of wire the outer end of the wire 16, upon completion of the winding operation, is led in to a location that is accessible through the opening at the inside of the coil. As shown in Figure 2, the end disc 13 is shown provided with a radial corrugation 25 which provides a clearance at the end of the coil 16 through which the outer end of the wire can be inserted. An opening is provided in the mandrel in such a manner that the outer end portion 26 of the wire, when pushed inwardly through passageway or recess 25 to bring its end to the center of the opening at the inside of the coil, may be in a position such as shown in dotted lines in Figure 1.

With the inner and outer ends 20 and 26 of the coiled wire both accessible from the opening through the coil the inner end 20 can be spliced to the outer end of a similarly packaged coil, and the outer end 26 can be spliced to the beginning of another similarly packaged coil of wire so that any number of coils can be payed out successively without stopping to make connections. This is useful when laying communication lines quickly from a moving vehicle. The end portion 26 is located behind the disc 21 in Figures 1 and 2, but this disc 21 does not interfere with the wire because the disc 21 is knocked down by the end portion 26 as soon as the remainder of the coil 16 is withdrawn from the container.

It is a feature of the invention that the outer shell 17 is connected to the end discs 13 and 14 while the coil remains on the mandrel 10 with the end discs 13 and 14 backed up by the flanges 11 and 12. In the construction illustrated in Figures 1 to 3 the end discs 13 and 14 are provided with flanged rims that extend in opposite directions away from the coil, and the shell 17 is somewhat longer than the length of the coil plus the lengths of the flanged rims of the end discs so that the opposite ends 71 of the shell 17 can be spun or turned over to a U-shaped contour that embraces the flanged rims of the end discs in the manner illustrated in Figure 3.

In order to prevent possible scratching of the wire, and particularly the insulation thereof when the container is constructed around a coil of insulated wire, the center openings through the end discs 13 and 14 desirably are provided

with lips or beads 28. These lips, which also reinforce the container, are made by rolling over the edges of the center openings through the end discs to provide a smooth surface across which the wire can slide as it is pulled out of the can and to provide a bead for holding covers on the ends of the can.

The center openings of the can or container can be closed with a cap 29 that has side portions which snap over the rounded bead of the lip 28. The side portions of the cap grip the bead firmly so that the cap is held in position until removed by force. There is a gasket 30 of rubber or other suitable gasket material, held in a peripheral recess in the cap 29. This gasket provides a water and air-tight seal. If desired, the outer side portions of the cap which snap over the lip 28 may be shortened or omitted. In that case the cap should engage the lip 28 with a tight frictional contact to hold the cap in place and to provide a tight seal without a gasket. Similar covers may be provided at both ends of the container, or the container can be permanently closed at one end after the mandrel is removed.

When wire is payed out from the inside of a coil, the danger of snarling can be reduced by withdrawing the wire along and through a guide located at the axis of the coil. As shown in Figure 3, the cap 29 has an eyelet 31 that is located at the center of the cap and constructed of porcelain, wood, or other smooth material that has sufficient strength to avoid abrasion as the wire is pulled through it. The container may be closed during shipment and storage by a cap 29 having no eyelet and, when the wire is to be withdrawn, the solid cap can be removed, the leading end of the wire withdrawn and threaded through eyelet 31 of another cap 29. The cap 29 with the eyelet is then snapped over the bead 28 and the container is ready for the withdrawal of wire. The necessity for two caps can be avoided, however, by providing an eyelet 31 in the cap that is used for shipping and plugging the eyelet 31 with wax, cork, or other soft material 35 that can be removed when the wire is to be withdrawn from the container. In any case, it is necessary to remove the cap 29 so that the inner lining 18 can be withdrawn from the container and the lead end of the wire threaded through the eyelet 31. After that has been done the cap 29 can be replaced and wire withdrawn from the container.

Figure 4 shows an end disc 32 that is of similar construction to the end disc 14, except that the center opening has no bead or lip 28. The opening through the center of the end disc 32 is closed by a cover 33 which fits into the opening and is permanently secured in place by solder 34, or other fastening means.

With this invention the wire is payed out from the inside of the coil and this tends to give the wire a twist. When winding such wire into a coil from which the wire will be removed at the inside it has been proposed to pre-twist the wire as the coil is being wound, this pre-twist being in the opposite direction to the twist which will be placed in the wire as it is payed out. It is necessary with such pre-twisted coils, however, that the wire be withdrawn from the proper end of the coil. Withdrawing it from the wrong end will add to the twist instead of compensating for the pre-twisting of the wire. Such coils can be packaged in a can having the one end permanently closed as illustrated in Figure 4, so

that it is impossible to take the wire from the wrong end of the can.

Instead of using the corrugated paper 23 to fill the space between the outside of the coil 16 and the inside surface of the container a plastic material can be applied to the outside of the coil to build the coil up to the full diameter of the end discs. Thermoplastic material 36, such as the stripping compounds used for weather-proofing metal parts for ocean shipments, can be applied to the outside of the coil by dipping, by pouring, by spraying, or by a brush 37 as illustrated in Figure 5.

The outside of the coil 16 ordinarily is not smooth and best results can be obtained by applying the plastic stripping compound 36 in a heavy layer that extends outwardly slightly beyond the outside edges of the end discs and then cutting off excess material, after it has cooled and hardened, by means of a cutting tool 39; illustrated diagrammatically in Figure 6. This trimming operation to bring the diameter of the plastic material 36 down to the proper dimension to fit smoothly within the can or package desirably will be done while the coil 16 is still on the mandrel and can be rotated in the same way that work is rotated past the cutting tool of a lathe.

Alternatively, the amount of plastic material sprayed, brushed, poured or otherwise applied to the outside of the coil may be only enough to lock the last layer of wire in place, and the remaining space between the plastic material and the full diameter of the end discs may be filled by wrapping corrugated paper or other suitable material around the plastic material.

When the plastic material is used to build up the diameter of the core, the outside shell 17 is applied over the plastic material 36 in the same way that it is applied over the corrugated paper 23 in Figure 1, but the plastic lining provided by the stripping material 36 has an advantage over corrugated paper in that it is strong enough to prevent heavy coils of wire from becoming loose and rattling in the container or package.

The wire package container of this invention may be constructed around the coil of wire in various ways. While the package container is a metal can in the preferred embodiments of the invention it is not essential that it be made of metal, although some features of the invention claimed herein do relate specifically to such construction.

In the construction illustrated in Figures 1 to 3, the shell 17 has a longitudinal seam that must be closed after the shell is applied to the coil. Other methods of constructing the container can be used that permit the side of the can to be preformed into a cylindrical shell with a longitudinal seam that is closed prior to the application of the cylindrical shell to the coil of wire.

Figure 7 shows such a construction. An end disc 40 is placed against the flange 11 and another end disc 41 is placed against the flange 12. The disc 40 is shown with an offset peripheral rim portion 42 that is larger than the diameter of a cylindrical shell 43 to which it is to be connected. This offset peripheral portion 42 forms a cupped rim of substantial depth. The cylindrical shell 43 is preformed and provided with an outturned end 44 and intumed end 45. Near the end 45 there is a shoulder 46 beyond which the cylindrical shell 43 is of reduced diameter. The purpose of this change in diameter is to enable the reduced diameter end of one can to nest snugly into the cupped rim at the op-

posite end of another can for connecting cans together into groups for shipment or storage.

The end disc 41 has a flanged portion 47, the outside diameter of which is a shade less than the inside diameter of the reduced diameter end of the preformed shell 43. This correlation makes it possible to slide the shell 43 over the rim portion 47 and to move the shell 43 longitudinally over the coil 16 until the outturned end 44 of the cylindrical shell 43 comes in contact with the rim 42 of the end disc 40.

The disc 40 is connected to the shell 43 by spinning or turning the rim portion 42 over the outturned end 44 as indicated in dotted lines in Figure 7 and, if desired, by then turning the seam against the side of the can as shown at the left-hand end of Figure 9. The cylindrical shell 43 is connected to the end disc 41 by spinning or bending the inturned end 45 of the shell 43 around the inwardly extending end of the flanged rim 47. The seam may then be bent further, into the relation shown at the right-hand end of Figure 9. This results in double seaming which when used with the proper seaming compound provides water-tight, air-tight seams.

Other methods of constructing the package include the use of a wrap-around shell of the proper length to fit between the end discs and with turned beads or rims at the ends of the shell. In that case the outer edges of the end discs will be spun or turned around the beads or rims on the shell for connection therewith. Various other methods of constructing cans around the coil while it is wound around a mandrel and held between the flanges 11 and 12 can be employed. The body or shell of the can may be provided with handles, or supports, such as a ring or rings 50 joined to the shell 43 by a bracket 51 that preferably is welded to the shell.

One construction for the mandrel 10 is shown in Figures 7 and 8. This form of mandrel includes a socket section 53 into which telescopes the end of a plug section 54. The reduced diameter end of the plug section 54 is slightly shorter than the socket in the section 53 so that the shoulder 56 at the end of the reduced diameter portion abuts against the end of the socket section 53 and there is no groove between the outside surface of the sections 53 and 54. To hold the sections of the mandrel assembled a ball latch 57 may be provided in the plug portion 54 to engage a recess or opening 53 in the side wall of the socket into which the end of the mandrel section 54 extends. In another form the ball latch is replaced with a pin and the socket has an L-shaped slot in its inner wall to receive the pin and lock the assembled members together by a partial turn of the plug in the socket.

The outside surface of the mandrel section 53 desirably is provided with angularly spaced grooves 60 and a leaf or wire spring 61 is located in each of these grooves 60. The springs 61 extend for substantially the full lengths of the grooves 60 and each spring may be held in place by a screw 63 located near one end of the spring. The purpose of these springs 61 is to prevent the wrapping 18 from fitting around the mandrel so tightly that the mandrel is difficult to remove after the wire has been wound and the package container constructed around the coil.

When a package made according to this invention contains wire that has very little stiffness the structure shown in Figure 10 can be used to

insure against snarling of the wire as it is payed out from the container. A cone 65 fits into the opening at the center of the coil 16 and is preferably of such length as to extend substantially halfway through the wire opening in the eyelet 31. When using such a cone the eyelet 31 must be large enough to provide around all sides of the cone a clearance somewhat larger than the diameter of the wire within the package.

The cone 65 may be connected with a cap that fits over the lip 28 in the same way as the cap 29. This construction will be used with cans that are moved from place to place for supplying wire. If the can or package is used on a bench, or at some other fixed location, the cone 65 preferably is connected to the bench or other location by a bracket 67 which provides a support on which the can is placed when wire is to be withdrawn.

Although the invention has been described as used with wire, it will be understood that it can be used with twisted wires or other multi-conductor wire or cable in which two or more wires are laid together. Changes and modifications can be made in the illustrated embodiments and some features of the invention can be used without others without departing from the invention as defined in the claims.

I claim as my invention:

1. A package for an open-center coil from which wire is to be payed out from the center, said package comprising a helically wound lining for the open-center coil, said lining having a tab at its inner end and having its outer end connected to the lead end of the coil of wire, discs at opposite ends of the coil, at least one of which has a central opening providing access to said tab, and a shell around the outside of the coil connecting the end discs.

2. A package for an open-center coil of wire, said package comprising a collapsible, longitudinally split tubular liner around which the coil of wire is wound, discs at opposite ends of the split liner, at least one of said discs having a central opening with a diameter equal to the inside diameter of the tubular liner, the inner end of the coil of wire being fastened to the liner, and an outside shell around the coil and secured to the end discs.

3. A container for a coil of wire that has a central opening from which wire is withdrawn, said container comprising end discs, at least one of which has a central outlet for the passage of wire, and at least one of which has a cupped rim portion of substantial depth into which the opposite end of a similar container can nest, and a cylindrical body or shell surrounding the coil and secured to the end discs, said body or shell having a reduced outside diameter at one end of a size to nest in a cupped rim portion similar to that at the other end of the container.

4. A package for a coil of wire from which wire is payed out from an open core, said package including an end disc with an opening at its center of a diameter somewhat less than the diameter of the original open core of the coil, said opening having a rim extending longitudinally from the disc and curved outward to form a bead around the opening, a cover that fits over the opening in the disc and that has edge portions that snap over said bead to hold the cover on the package, and a sealing gasket in the cover compressed by the cover against said bead.

5. A sealed package for enclosing an open-

center wire coil from which wire is withdrawn at the center, said package comprising sheet-metal end discs in one of which there is an opening with a rounded lip across which the wire passes when pulled out through said opening, a cylindrical shell surrounding the coil and connected to the end discs by turned-over seams that join the shell to the end discs to form a can around the coil, lining within the can between the coil of wire and the inside wall of the shell, and a cover that fits said opening and is held on the can by the rounded lip for sealing the can.

6. A package for a coil of wire from which wire is payed out from the center, said package comprising discs at opposite ends of the coil, an outside shell surrounding the coil and connected with the discs, a rim portion surrounding a central opening through one of the discs, a bead on the rim portion, a removable cover having edge portions that engage the bead to hold the cover securely on the end discs, and an eyelet through the cover in substantial alignment with the axis of the coil of wire.

7. A package for an open-center coil of wire from the inside of which wire is withdrawn as needed, said package including end discs that hold the coil against axial displacement, center openings in said discs for access to the interior of the coil, a recess in one end disc providing clearance through which the outer end of the coil is passed inward to a location accessible through one of the center openings for connecting said outer end with the inner end of a subsequent coil, and covering means around the outside longitudinal surface of the coil including a shell

with its opposite ends connected to the end discs to form a container.

8. A package for an open center coil of wire from the inside of which wire may be withdrawn as needed, said package including end discs that hold the coil against axial displacement, covering means around the outside longitudinal surface of the coil comprising a cylindrical shell with its opposite ends connected to the end discs to form a container enclosing the coil, one of said end discs having a central opening through which the wire may be withdrawn, and the other end disc having a centrally disposed conical shaped member projecting inwardly therefrom with the apex of the cone extending into the central opening of the first end disc, so as to prevent snarling of the wire during movement of the packaged coil and as the wire is withdrawn from the inside of the coil through the central opening in the first disc.

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