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WIRE DISPENSING DEVICE

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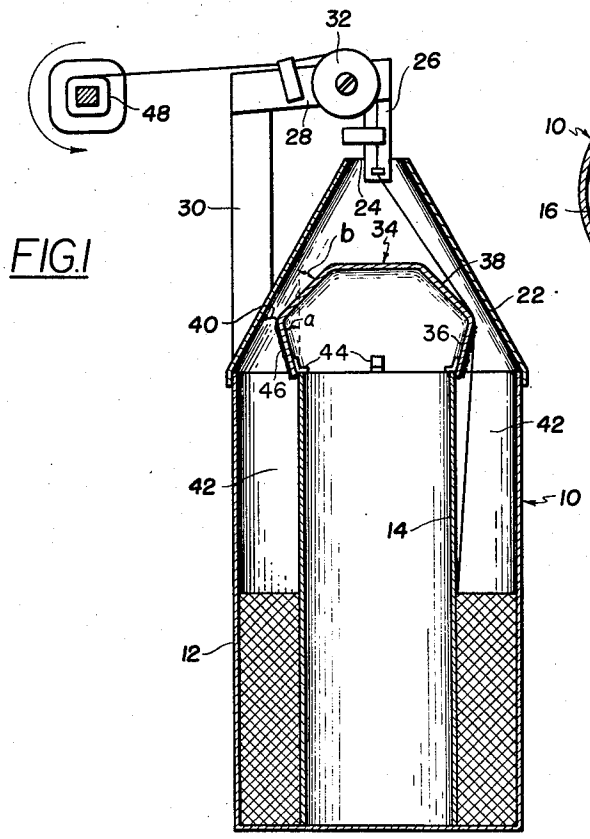

FIG.1

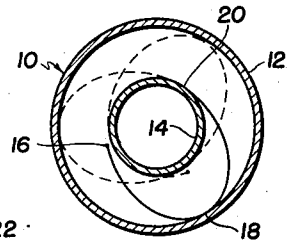

FIG.3

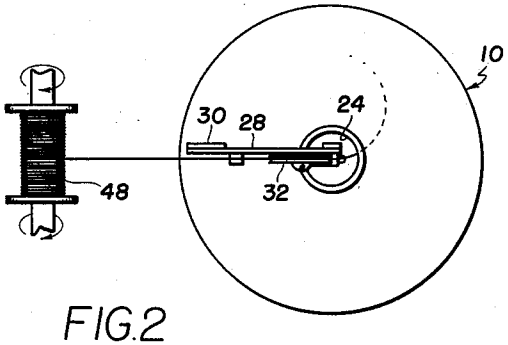

FIG.2

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WIRE DISPENSING DEVICE

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The present invention relates to a wire dispensing device, and more particularly to a device from which a continuous length of coiled wire may be withdrawn at a relatively high rate of lineal velocity.

In the mass production of coils used in electrical equipment, it is conventional to rotate a core at a relatively high rate of speed to wind the required number of turns on the core in a minimum of time. Coil forms vary in cross-section from perfectly round to ovular, square, and the like shapes. When winding circular coils, a constant angular velocity of coil rotation will, of course, require a constant lineal velocity of wire being fed thereto. However, a coil of square cross-sectional shape which is rotated at a constant angular velocity will jerk the wire being wrapped thereon, whereupon certain problems are encountered which normally require that the speed of rotation of the square coil be somewhat less than that of the circular coil.

The present invention is particularly adapted to the winding of coils of any cross-sectional shape at a greater velocity than has heretofore been possible. As a consequence, more coil units can be fabricated in a given period of time, whereby considerable savings in the cost of the finished product is achieved.

The principal feature of the invention resides in a wire retarding base in the form of an inverted cone having dampening walls extending upwardly and outwardly to terminate short of the adjacent inner surface of the usual conical guide through which the wire passes. The purpose of such an inverted cone is to dampen the elliptical action which is set up in rapidly withdrawing the wire from the drum, it being noted that usually the wire is coiled in the drum in eccentric loops. Thus, as the wire is withdrawn it gains momentum and inertia until it throws a loop ahead of itself such as to develop a knot in the wire. The inverted cone is effective to dampen and prevent the wire looping ahead of itself as it breaks away from the inner core or tube.

In view of the foregoing, it is an object of this invention to provide a wire dispensing device whereby a continuous length of wire may be withdrawn at a relatively high velocity over a relatively long continuous period of time without interruption.

Other objects will become apparent as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that specific change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

In the drawings:

Fig. 1 is a vertical section of one embodiment of this invention;

Fig. 2 is a top plan view thereof; and

Fig. 3 is a diagrammatic illustration showing how wire is normally stored in the container of Figs. 1 and 2.

With reference to the drawings, a barrel type container, generally indicated by the reference numeral **10**, is composed of an outer tubular wall **12** and an inner core wall **14**. These walls are coaxially related and provide an annular storage space therebetween which is filled with a continuous length of enamelled soft copper wire. While this particular wire is specified as an example, it will be obvious that other wire may be stored and dispensed from the mechanism. The storage space is shown as being approximately half filled with wire in Fig. 1, and the wire is so stored by being laid in a continuous coil around the core wall **14**. Reference to Fig. 3 diagrammatically illustrates how the wire is disposed in the annular storage space, and for illustrative purposes three turns of wire have been shown. It will be noted that each one of the three turns is eccentrically arranged in the storage space and such eccentricity may be traced as starting with point **16**, moving to the outer wall **12** at point **18**, turning inwardly against the core **14** at point **20**, then moving outwardly to a point adjacent the outer wall, etc. until the three illustrated eccentric coils are laid in angular spaced relation into the storage space as shown. Methods for eccentrically storing coils of wire are well-known in the art and need to be further elaborated here.

Referring now to the Figs. 1 and 2, a frusto-conically shaped guiding cone **22** is coaxially fixed to the upper end of the container wall **12** and is provided with an opening **24** at its apex for receiving the end of a wire-guiding frame **26**. This frame **26** has a downwardly inclined beam **28** which is supported by an upright member **30** suitably secured to the outer surface of the cone **22**. A conventional tensioning device or capstan **32** is rotatably mounted on the frame **26** in registry with the opening **24**, and is provided with adjustable friction means to retard or inhibit rotation.

Mounted internally of the cone **22** is a second cone or retarding element indicated generally by the reference numeral **34**. This inner cone is composed of two conical portions, a lower portion **36** and an upper portion **38**. The lower portion is telescopically fixed to the discharge end of the core wall **14** and inclines toward the wall **12** extended and extends outwardly beyond the aforementioned discharge end as shown. The other conical portion **38** is oppositely arranged as shown.

The particular inclination of the conical surface **36** produces an annular opening or space **40** which is smaller than the annular storage space **42** between the inner and outer walls **14** and **12**, and which is so positioned as to lie approximately in between the two container walls as shown. The inclination of the conical surface **36** with the vertical is represented by the angle "*a*" and preferably lies within the range of twelve to twenty degrees (12° to 20°). The angle which the conical surface **38** makes with the vertical is not critical and may be forty-five degrees (45°). Suitable supporting brackets or angles **44** secured to the inner surface of the inner core **34** abut the upper end edge or discharge end of the core wall **14** to provide support for the inner cone.

Both of the inner and outer cones **34** and **22**, respectively, are preferably detachably secured to the container **10** against accidental dislodgment.

Improved results are obtained with some types of wire when the conical surface **36** is covered with flock material **46**, which material is conventionally used as coverings for trunks of automobiles, and is also used in electronic equipment for insulating cabinet surfaces. The importance of the presence of this flock material **46** will be explained more fully in the following.

As seen in Fig. 1, a strand of wire from the annular space **42** is threaded between the inner and outer cones **34** and **22** through the apex opening **24**, about the reel

32 and onto a coil form 48. This coil form is square in cross-section and represents one of the most difficult coil designs for winding at a high rate of speed. As the core 48 is rotated, wire is drawn out of the annular space 42. Since the wire is actually drawn axially from the space 42, it obviously follows that the wire will travel circumferentially around the wall 14.

In prior art arrangements which utilized the annular storage 42 and from which wire was axially drawn at a relatively high rate of speed, difficulty was normally encountered in the respect that the wire would uncoil too rapidly at times and would become knotted, thereby requiring that the equipment be stopped for clearing the knot and repairing any damage that may have occurred. This difficulty usually occurred when the wire was withdrawn from the storage space 42 at too great a velocity, such that the greatest rate at which wire could be withdrawn from the container 10 was limited to a value at which such knotting would not occur.

This invention considerably increases the upper limit at which wire may be withdrawn from the container 10, and thereby considerably increases the rate of production of coils. This increased efficiency is believed to be primarily due to the fact that the particular inclination of the conical surface 36 and the presence of the annular opening 40, which is of greater diameter than the core wall 14, serve as a brake against the wire leaving the mechanism too fast. Prior art arrangements permitted the wire being uncoiled to gain such momentum upon leaving the storage space that it would uncoil circumferentially around the core wall 14 at a rate exceeding that required by the lineal velocity of the wire leaving the mechanism. This caused the uncoiling wire to loop over itself and to tie a perfect knot.

While the invention materially improves efficiency when the conical surface 36 is a smooth metallic surface, the use of flock material 46 further improves the efficiency when smaller sizes of wire are dispensed.

While the different portions of the apparatus may be made of different suitable materials, satisfactory results have been achieved with the container 10 being fabricated from a paper base material, and the cones 22 and 34 being made from self-supporting metal.

What is claimed is:

1. A wire dispensing device for withdrawing at high speeds a substantially continuous length of wire loosely accommodated within an annular storage space, said device comprising a container having substantially coextensive and co-axial inner and outer walls defining the annular storage space therebetween, said container having an open end through which wire is withdrawn and a closed end which affords support for the wire in the annular storage space, a conical cover member provided with an opening at its apex and mounted at a larger open end in overlying relation to the open end of the container, a wire-motion damping element mounted on said inner wall adjacent the open end of the container and having an annular surface extending into the area bounded by said cover member and over said annular storage space, said annular surface being inclined and having a slope which is reversed with respect to the slope of said cover member to provide an annular spacing between the cover member and said surface, and said wire-motion damping element having another annular surface extending from the first said annular surface toward the apex of said cover, said second annular surface being inclined and having a slope which is the reverse of that of the first annular surface.

2. A wire dispensing device for withdrawing at high speeds a substantially continuous length of wire loosely accommodated within an annular storage space, said device comprising a container having substantially coextensive and co-axial inner and outer walls defining the annular storage space therebetween, said container having an open end through which wire is withdrawn and a closed end which affords support for the wire in the annular storage space, a conical cover member provided with an opening at its apex and mounted at a larger open end in overlying relation to the open end of the container, a wire-motion damping element mounted on said inner wall adjacent the open end of the container and having an annular surface extending into the area bounded by said cover member and over said annular storage space, said annular surface being inclined and having a slope which is reversed with respect to the slope of said cover member and terminating short of the cover member to provide an annular spacing between the cover member and said surface.

3. A wire dispensing device for withdrawing at high speeds a substantially continuous length of wire loosely accommodated within an annular storage space, said device comprising a container having substantially coextensive and co-axial inner and outer walls defining the annular storage space therebetween, said container having an open end through which wire is withdrawn and a closed end which affords support for the wire in the annular storage space, a conical cover member provided with an opening at its apex and mounted at a larger open end in overlying relation to the open end of the container, a wire-motion damping element mounted on said inner wall adjacent the open end of the container and having an annular surface extending into the area bounded by said cover member and over said annular storage space, said annular surface being inclined at an angle of between about 12–20° to the axis of said inner wall and having a slope which is reversed with respect to the slope of said cover member and terminating short of the cover member to provide an annular spacing between the cover member and said surface.

4. A wire dispensing device for withdrawing at high speeds a substantially continuous length of wire loosely accommodated within an annular storage space, said device comprising a container having substantially coextensive and co-axial inner and outer walls defining the annular storage space therebetween, said container having an open end through which wire is withdrawn and a closed end which affords support for the wire in the annular storage space, a conical cover member provided with an opening at its apex and mounted at a larger open end in overlying relation to the open end of the container, a wire-motion damping element mounted on said inner wall adjacent the open end of the container and having an annular surface extending into the area bounded by said cover member and over said annular storage space, said annular surface being inclined and having a slope which is reversed with respect to the slope of said cover member and terminating short of the cover member to provide an annular spacing between the cover member and said surface, and a wire guiding and tensioning element mounted on said cover member adjacent the apex of the cover member adapted to accommodate the wire as it is drawn through the said apex opening of said cover member.

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