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[54] **TUBULAR DRUM PAYOUT**

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[52] **U.S. Cl.** **242/129**

[51] **Int. Cl.** **B65h 49/00**

[58] **Field of Search** 242/128, 129; 57/106–108

[56] **References Cited**

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[57] **ABSTRACT**

A wire payout assembly that fits over the upper end of a drum of wire to prevent coils and groups of coils that come out of the drum from reaching a wire winding machine. The wire leaves the drum along an inner cone that holds loops of wire substantially horizontal as they unwind. Successively smaller diameter turns of tubing in an outer cone cause any groups of coils to pull apart into individual coils that unwind more easily. Guiding means at the top of the outer cone lead the wire to a winding machine or other use location.

11 Claims, 5 Drawing Figures

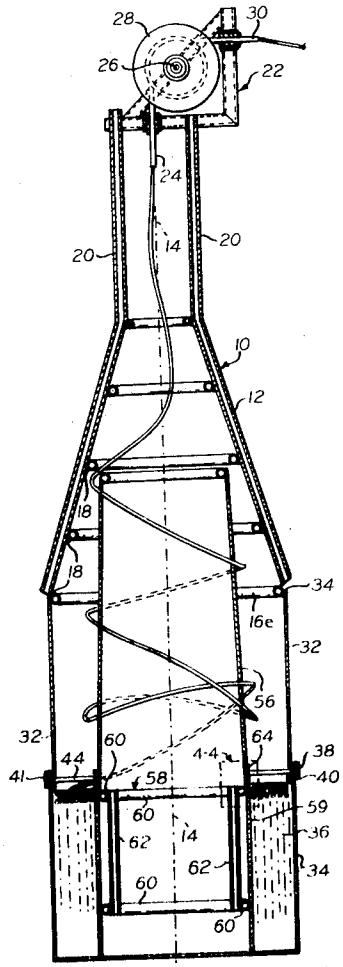


FIG. 1.

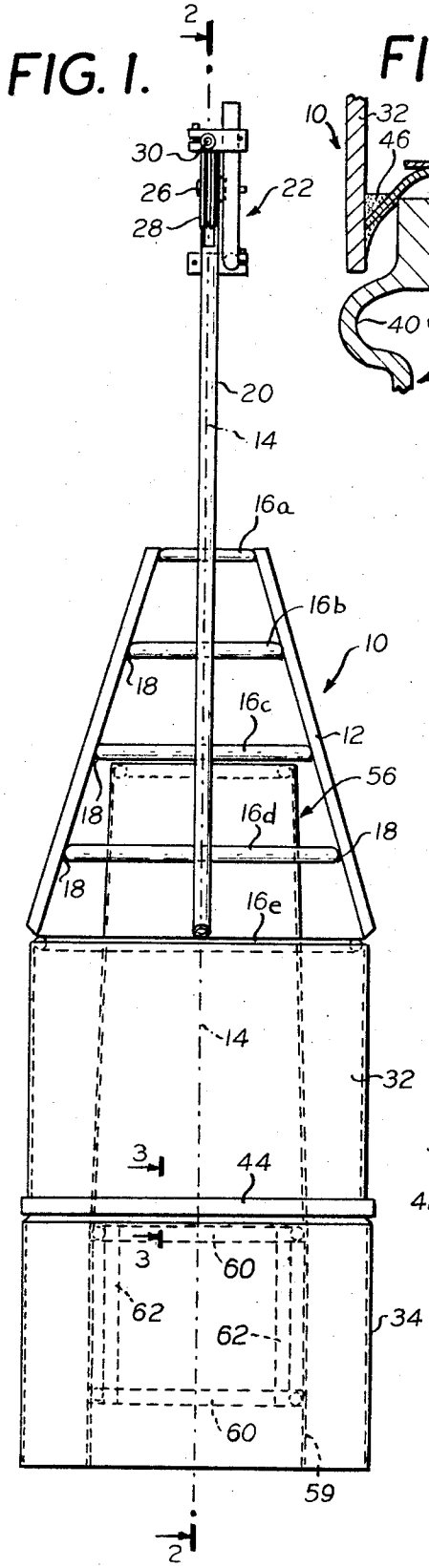


FIG. 3.

FIG. 2.

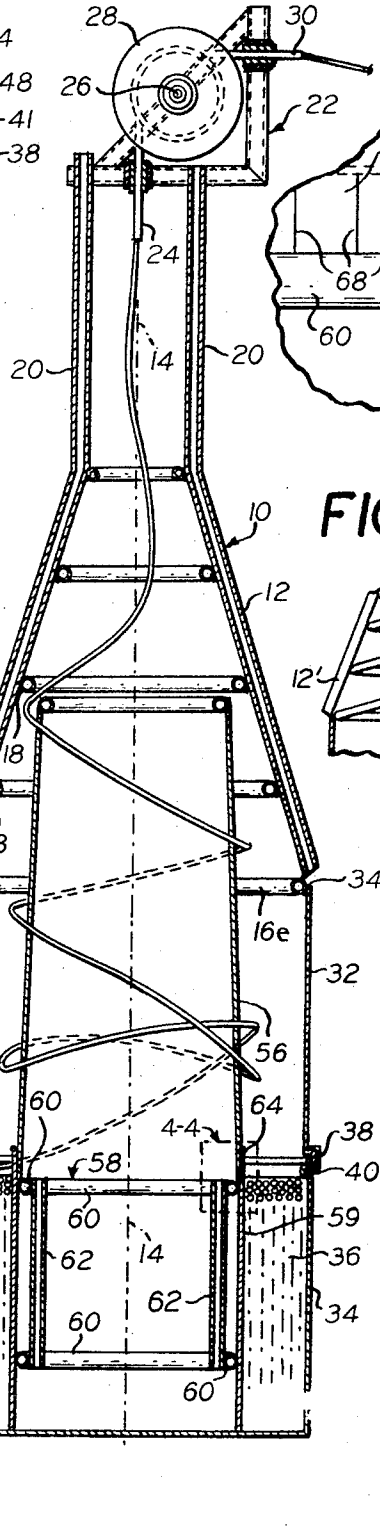


FIG. 4.

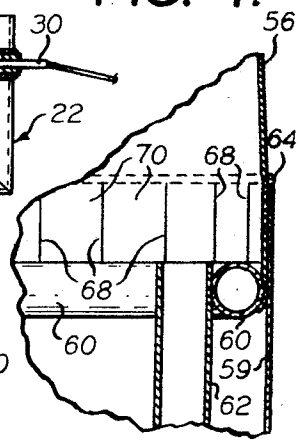
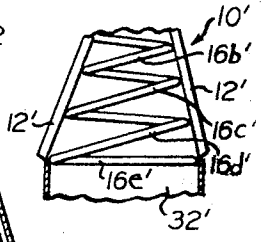


FIG. 5.



TUBULAR DRUM PAYOUT

BACKGROUND AND SUMMARY OF THE INVENTION

When paying out wire from drums, individual coils or small groups of coils which normally lie in the horizontal position sometimes move into a vertical plane as they leave the drum. The tension in the wire leaving the package will cause such a vertical loop to close down into a very small *e* shape which cannot pass through winding machines. To prevent the formation of such an *e* this payout provides an inner cone of such length that the wire has assumed a large pitch helix (open spiral) before the coil is free to assume improper position. To prevent the wire coils from clamping tightly on the inner cone, as they reduce in size during payout, the inner cone is made with a slight taper.

To separate groups of coils, which try to leave the package as a unit, into individual coils, a series of hoops is provided. Each successive hoop, that the wire must pass through, is smaller than the previous one. The spacing between them allows random coils from the group to momentarily catch and separate from the group. By the time such a group has passed through the series of hoops the group has been reduced to separated individual coils.

The hoops are constructed of steel tubing and assembled by brazing so that all surfaces are smooth and rounded. It is also desirable to obtain maximum rigidity with minimum weight, so light weight steel tubing is used as the primary construction material. The hoops are assembled by brazing because of the smooth surface produced as compared to arc welding.

The series of hoops can also be constructed from one continuous tube shaped into a large pitch, 6-inch pitch for example, tapered helix. The entry should be sized for the drum and the exit should be comparatively small, 3 or 4 inches in diameter for example.

As the wire leaves the area of the hoops, it enters a guide tube which guides it into a very deep grooved pulley. An exit guide tube is also provided. The guide tubes guide the wire back onto the pully when the wire has over traveled due to very rapid winding machine stops.

The payout assembly of this invention has a lower end of the outer cone constructed to fit over and to be positioned by the upper end of a standard wire drum. The inner cone fits into the drum and into the open space at the center of the coil of wire contained in the drum.

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

BRIEF DESCRIPTION OF THE DRAWING

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views;

FIG. **1** is a side elevation of the payout assembly of this invention shown mounted on a wirecontaining drum from which wire is to be removed;

FIG. **2** is a sectional view taken on the line **2—2** of FIG. **1**;

FIG. **3** is a greatly enlarged sectional view through the lower portion of the frame on one side and illustrating the way in which the frame is supported from a rim at the top of the wire drum, the section being taken on the line **3—3** of FIG. **1**;

FIG. **4** is an enlarged detailed view at the location **4—4** of FIG. **2** illustrating the connection between the upper and lower parts of the inner cone; and

FIG. **5** is a small scale, diagrammatic view showing the frame of FIGS. **1** and **2** constructed with a helical tube in place of the spaced hoops of FIGS. **1** and **2**, this being a modified form of the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

The wire payout assembly includes a frame **10** which has tubing **12** located at angularly spaced locations around an axis **14**; the angular spacing in the illustrated embodiment being 90°. Each of the tubes **12** is connected to a number of hoops or turns of tubing **16*a***, **16*b***, **16*c***, **16*d*** and **16*e***.

The turns of tubing **16** are preferably evenly spaced from one another in a vertical direction and they are connected at points **18**, by brazing or otherwise, to the converging tubes **12** so as to form a frusto conical frame.

Two of the tubes **12** extend upwardly beyond the top turn of tubing **16*a*** to form vertical standards **20** which are part of the frame **10** for supporting a bracket **22** connected with the vertical standards **20** so that the bracket **22** is an integral part of the frame **10.** A guide **24** consists of a tube with its axis in alignment with the vertical axis **14** of the frame.

The bracket **22** supports an axle **26** on which a grooved pulley **28** rotates. This grooved pulley is located so that the bottom of its groove is tangent with the axis **14** immediately above the end of the guide tube **24** and there is another guide tube **30,** supported by the bracket **22,** with its axis tangent with a portion of the pulley groove at the top of the pulley.

The guide **30** extends in the direction in which wire is to be supplied by the wire payout assembly and in the construction illustrated this guide **30** is shown standing in a horizontal direction. However, it will be understood that the guide **30** can be supported from the bracket **22** in different locations depending upon the direction in which the wire is to feed from the pulley. It is a feature of the construction, that the ends of the guides **24** and **30** which are closest to the pulley, are so close as to cause the wire to come back into the groove of the pulley in the event that slack accumulates in the wire which carries the wire out of the pulley groove. For example, if the payout of wire should be stopped very suddenly, the momentum of the wire feeding upward through the payout assembly might cause slack to accumulate at the pulley **28** and this slack would carry the wire beyond the pulley at the location of the pulley arc between the guide tubes **24** and **30.**

Below the turn of tubing **16*e***, the frame **10** is constructed of a cylindrical sheet metal shell **32** which is permanently connected by a welding or brazing to the lower hoop or turn of tubing **16*e*** at a level **34** which extends around the circumference of the turn of tubing **16*e***. The wire which is to be payed out is contained in a standard wire drum **34**; and the wire is designated by the reference character **36.** Such drums have a ridge **38** around their upper ends with a groove **40** below the ridge and into which a circumferential clamping ring **41** is fitted when the drum is closed prior to shipping. When the wire is to be payed out from the drum **34,** the lid is removed and the payout assembly of this inven-

tion has the frame **10** placed on the ridge **38** as shown in FIG. **2** and as shown in more detail in FIG. **3.** The frame **10** is held on the ridge **38** by using the clamping ring **41** for the purpose.

FIG. **3** shows the cylindrical sheet metal shell **32** with an annular support **44** welded to the lower end of the shell **32** by welding **46.** This connection can be brazed or made in other ways provided that the annular support **44** is an integral part of the shell **32** and extends all the way around the circumference of shell **32** with the concentricity necessary to fit over a standard cable drum.

One convenient way in which the annular support can be made is to take a lid from a standard wire drum package and cut out the center of the lid with the cut-out of a diameter equal to the outside diameter of the cylindrical sheet metal shell **32.** This leaves the lid with the cross-section as shown in FIG. **3** and it can be conveniently welded to the sheet metal section **32** to provide the support **44** with its lower concave surface **48** which fits over the ridge **38** and extends downward outside of the ridge.

The wire payout assembly also includes an inner element **56** which is preferably made of sheet metal and made with a slight taper to smaller diameter as the cone **56** extends upward. The axis of the inner element **56** is substantially coincident with the axis **14** of the frame **10.**

The lower end of the inner element **56** has a base or lower portion **58** which fits into a cylindrical core **59** which is part of the wire package and inside of the coil of wire **36** in the drum **34.** The base or lower portion **58** is braced with turns of tubing comprising hoops **60** that are held in spaced relation to one another by vertically extending sections of tubing **62** The hoops **60** are brazed or otherwise permanently connected to the vertically extending tubing **62** and the sections of tubing **62** are angularly spaced around the axis **14.**

It is conventional for these wire drums to be of the same diameter and those which are intended to hold more wire are made deeper. Drums fifteen inches deep are a standard size and other drums of standard size are 30 inches deep for holding twice the length of wire of the smaller drum. In FIGS. **1** and **2,** the wire payout assembly is being used with a 15 inch drum. With a 30 inch drum, the frame **10** is still supported from the ridge at the top of the drum. The inner element **56** has a shoulder **64** which rests on the top of the inner drum core **59.** The top of the inner core is at the same elevation, relative to the outside top rim of the drum on all conventional drums, regardless of drum length.

Sawcuts **68** are made in the sheet material of the tapered portion of the inner cone **56** extending parallel to the axis **14** and at angularly spaced regions around the circumference of the inner cone so as to leave tabs **70.** These tabs are then bent around the lower part of the hoop **60** and brazed to the hoop to secure the sheet material to the base or lower portion of the inner element **56.** A wire hoop **74** is placed around the tapered portion at the upper ends of the tabs **70** to provide the shoulder which rests on the top end of the inner core **59** of the drum. It will be understood that the upper frusto conical sheet metal portion of the inner element **56** can be connected to the base or lower portion **58** in other ways than that illustrated in FIG. **4;** but the construction shown in FIG. **4** is simple, strong and inexpensive.

The operation of the invention is as follows:

When wire from a wire containing drum is to be payed out with the payout assembly of this invention, the lid is first removed from the drum and the base or lower portion **58** of the inner element **56** is then inserted into the inner core **59** of the drum package at the center of the coil of wire in the drum. The inner element **56** is pushed down into the drum until the shoulder rests on the top of the inner core of the drum. The frame **10** is then placed over the inner element **56** and in substantial alignment therewith and lowered until the lower end of the frame **10** rests on the ridge **38** at the top of the drum **34.**

The end of the wire which is to be payed out, and which is led from the drum before inserting the base or lower portion **58** of the inner element **56,** and the wire is passed upwardly between the outside of the inner element **56** and the inside of the frame **18;** and is passed through the tube constituting the guide **24,** around the grooved pulley **28** and through the guide tube **30.** The end of the wire is then led to a winding machine or any other location to which the wire is to be supplied during the payout.

As wire is pulled out of the drum **34** it is necessary for the coils of the wire to straighten out into straight runs; and the tapered inner element **56** serves to prevent coils which come out of the drum from turning into planes other than a substantially horizontal plane. These coils unwind most easily if they are in a horizontal plane when being pulled upward in a vertical direction. If a coil is free to move into a vertical plane, then the pull on the coil may reduce the coil to a small coil or tight *e* form which will kink the wire.

Sometimes groups of coils come out of the drum with the coils hanging together and this sometimes makes one coil interfere with the unwinding of another coil so that it is desirable to break up the group into separate coils. This is done by the spaced hoops or turns of tubing **16***a*–**16***e.* As groups of coils are pulled upward through the frusto conical frame **10,** portions of these coils strike against one or more of the hoops and this tends to cause the coils to separate. Any coil which strikes against one of the hoops encounters some resistance and this tends to cause it to hold back while other coils pull loose from it.

By the time the wire has reached the upper end of the taper of the frame **10** the coils are all pulled apart and in position to unwrap, if not already unwrapped, to form straight runs of wire at the guide tube **24.** The inside diameter of the guide tube **24** is large enough to permit free passage of the wire through the tube **24.**

One of the features of the construction illustrated is that the turns of tubing **16***a*–**16***e* are continuous around their circumference, the ends being joined by smooth connections; and there are no rough protrusions formed by welding of the frame or by any other feature of construction which would permit a loop of wire to actually catch on such a protrusion and the wire to be pulled into a kink. All surfaces with which the wire comes in contact are smooth for passage of the wire without catching or scratching and the reason for tapering the inner element **56** is to prevent wire loops from tightening on this tapered element as the loops tend to become smaller as they are pulled upward.

The taper of the inner element **56** is limited since a diameter of this cone which was very much smaller than the loops of wire would not have the same desir-

able effect in preventing loops from turning into vertically or partially vertical planes. Experience has shown that the taper of the inner element **56** for preventing loops from tightening on the cone as they are pulled upward does not require a taper any greater than about 1⅛ inch diameter reduction per foot of elevation.

FIG. **5** shows a modified form of the invention in which a helical tube is used in place of the separate hoops of FIGS. **1** and **2**. In the construction shown in FIG. **5** the successive convolutions of the helically formed tube are used in place of the turns **16***a* – **16***e* and these corresponding convolutions which are shown in FIG. **5** are indicated by the same reference characters as the turns or hoops **16**b, **16**c, **16**d and **16**e with a prime appended.

These convolutions **16***b'*, **16***c'*, **16***d'* and **16***e'* are brazed to upwardly converging tubes **12'** which correspond to the tubes **12** of the frame **10** shown in FIGS. **1** and **2**; and the convolutions function in the same way to separate groups of wire coils from one another as the wire is payed out from the drum.

The preferred embodiment of the invention has been illustrated and described, but changes and modifications can be made, and some features can be used in different formations without departing from the invention as defined in the claims.

What is claimed is:

1. A payout assembly for a wire drum package including in combination a frame having a lower end that supports the assembly with its vertical axis in substantial alignment with the axis of a drum containing a coil of wire that is to be payed out from said coil, a portion of the height of the frame being tapered and having successively higher turns of tubing with the successive turns of smaller diameter for contact with random coils of wire that may pass upward in a group of coils and by said contact to separate the group into individual coils that will pull out into straight runs of wire, an inner element within the frame and substantially coaxial therewith, the lower portion of said inner element having a diameter that fits into a wire drum core with which the payout assembly is intended to be used, and the upper portion of the inner element tapering toward its upper end to prevent any substantial shifting of loops of wire into other planes after the loops of wire leave the drum and move upwardly in the frame.

2. The payout assembly described in claim **1** characterized by the successive turns of tubing being separate hoops made of smooth tubing, and vertically-extending elements of the frame that hold the hoops in spaced relation to one another with vertical spacing between them.

3. The payout assembly described in claim **1** characterized by the successive turns of tubing being convolutions of a helical tube that extends around the axis of the vertical frame, the convolutions of the helical tube being held in position by other parts of the frame including vertically extending elements secured to convolutions of the helix at angularly spaced locations around the respective convolutions.

4. The payout assembly described in claim **1** characterized by a guide at the upper end of the frame including a tube in substantial alignment with the axis of the drum and frame, and through which the wire passes, the guide also including a grooved pulley for changing the direction of run of the wire, and another tube through which the wire passes after traveling around an arc of the pulley, the inside radius of the guide tubes being approximately equal to the radius of the cross-section of the pulley groove, and the ends of the guide tubes being so located so as to bring the wire back into the pulley groove when the wire comes out of the groove as the result of slack accumulation in the wire.

5. The payout assembly described in claim **1** characterized by the lower end of the frame having radially spaced surfaces that fit over the inside and outside of a top rim of a wire-containing drum for supporting the frame from the drum and for holding the frame in alignment with the drum.

6. The payout assembly described in claim **5** characterized by the lower end of the frame having a groove therein facing downwardly and of a diameter to fit over the top rim of the wire-containing drum, the radially spaced surfaces of the groove being the surfaces that fit over the inside and outside of the top rim of the drum.

7. The payout assembly described in claim **1** characterized by the inner element having a frusto conical ouside surface that decreases in diameter as it extends upward to prevent the loops of wire from becoming tight around the inner element as they travel upward and decrease in diameter.

8. The payout assembly described in claim **7** characterized by the lower end portion of the inner element being cylindrical, a wire drum core into which the cylindrical portion of the inner element fits at the center of a coil of wire contained within the drum.

9. The payout assembly described in claim **1** characterized by the inner element within the frame having its upper portion made of a sheet material tubular construction around which loops of wire pass upwardly from the drum as the loops unwind to straight runs, the upper portion of the inner element terminating below the top of the turns of tubing of the frame.

10. The payout assembly described in claim **9** characterized by the lower portion of the inner element including a ring at its upper end of an outside diameter to fit into the lower end of the sheet material that forms the upper portion of the inner element, the lower end of the sheet material being cut lengthwise at close angularly spaced locations around its circumference to form tabs that are bent around the ring from the outside thereof and secured to the ring to connect the upper portion of the inner element to the lower portion thereof.

11. The payout assembly described in claim **9** characterized by the turns of tubing of the frame and the surfaces of the tapered inner element, with which the wire contacts either usually or occasionally, having smooth surfaces and being free of roughness of welds and other protusions on which loops of wire could catch.

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