Abstract: This invention is a cable packaging machine, wherein both the coil type and the reel type packaging may be carried out via the same mechanism. The coil type and the reel type of winding processes are carried out by means of the coil head (47) and the reel winding head (48), which are located one within the other on a single winding head and perform the winding process according to the mode selected. Further, 1-2 meters before the cable (6) package on the winding head reaches the desired length, the stretch film (7) is wrapped around the cable (6) and when the cable package on the winding head reaches the desired length, the cable (6) is cut by means of the mechanism being used.
DESCRIPTION

CABLE PACKAGING MACHINE

Technical Field
This invention relates to a cable packaging machine wherein both the coil-type and reel-type packaging can be carried out via the same mechanism.

Background of the Invention
There are two types of packaging methods, which are most widely used in the cable market:

A- Coil-type packaging
B- Reel-type packaging

According to the general state of the art, separate machines should be used for each type of packaging, or the mechanical and electronic adjustments that consume considerable time are required to be carried out on the machine, to be able to perform both types of packaging. This causes a doubled investment cost for the manufacturers.

With the machine according to the invention, the aforementioned two types of machine (coil winding and reel winding machines) are combined in a single type of machine, and are offered to the market at the cost of just one type. Round or flat cables with diameters varying between 5-15 mm can be wound and packed in a fully automatic manner in the form of both the coil and reel, without the replacement of any parts. The desired packaging process can be carried out by means of selections made via the control panel of the machine, without installing or removing any parts.

Cable packaging machine consists of three main parts:
A- Motor unloader
B- Cable winding section
C- Packaging section

The Figures to Aid in a Better Understanding of the Invention
Figure-1 Overall front view of the machine
Figure-2 Perspective view of the motor unloader section of the machine
Figure-3 Perspective view of the mechanical cable accumulator of the machine
Figure-4 Front view of the cable guiding section of the machine
Figure-5 Perspective view of the travers group (proper cable winding apparatus)
Figure-6 Perspective view of the cable winding head
Figure-7 Position of the winding head in the reel mode
Figure-8 Position of the winding head in the coil mode
Figure-9 Perspective view of the cable cutting and stretch-wrapping unit
Figure-10 Fastening of the cable with the pressure shoe in the coil mode of winding
Figure-11 Beginning of the winding process during the coil winding, with the coil mode
   head being lowered
Figure-12 Overall perspective view of the formed coil
Figure-13 Beginning of the winding process during the reel winding, with the reel mode
   head being lowered
Figure-14 Overall perspective view of the wound reel
Figure-15 Preliminary preparation stage prior to wrapping the stretch film onto the
   cable reel
Figure-16 First stage of attaching the stretch film onto the product wound in the form of
   reel or coil
Figure-17 The process of wrapping stretch film over the product wound in the form of
   reel or coil and cutting off the stretch film
Figure-18 General view of the winding head, reel loading and unloading unit
Figure-19 Front view of the packaging section

In order to better describe the cable packaging machine developed according to this
invention, the parts indicated in the figures are assigned reference numerals. The
explanation is provided below for each part with an assigned reference numeral.

Reference Numbers
1- Hydraulic piston
2- An apparatus with two teeth one being opened in a manner opposite to the other
3- AC motor
4- Big reel
5- Two centers (right and left center)
6- Cable
7- Stretch film
8- Travers pipe
9- Pulley
10- Fixed pulley group
11- Mobile pulley group
12- Slide mounted on the horizontal body
13- Horizontal body
14- Pressure pulley
15- Pulley measuring the cable length
16- Lump detector
17- Pulley varying the movement orientation of the cable
18- The slides connected to the fixed base in the mechanical cable accumulator
19- The piston actuating the stretch film cutting and holding group
20- Stretch film cutting and holding group
21- Stretch film holding piston
22- Stretch film roll
23- Blade piston
24- Cutting head
25- Pipes with back and forth motion
26- Piston
27- Holding and releasing section
28- Counter weight
29- Press body
30- Motor and reducer group adjusting the head height
31- Slides in the cable winding head
32- The piston raising-lowering the coil mode head
33- The piston raising-lowering the reel mode head
34- Dropping group piston
35- Upper flange
36- Lower flange
37- The unit receiving the reel and positioning and delivering the same to the head
38- The reel on which the cable is to be wound
39- Back and forth motion piston
40- Positioning center
41- Reel mode head actuating group
42- Coil mode head actuating group
43- Pliers for holding the reel on which the cable is to be wound
44- Conveyor

5 45- The reel with the cable wound thereupon
46- Cable cutting blade
47- Coil mode head
48- Reel mode head
49- Pressure shoe

10 50- Shrink nylon rolls
51- Shrink nylon
52- Blade
53- Tunnel
54- Cooling fan

15 55- Coil

**Description of the Invention**

The machine according to the invention combines the aforementioned two machine types in a single type of machine.

20 The machine consists of the following parts:
A - Unload section
B.1- Mechanical accumulator section
B.2- Cable guiding section
B.3- Travers section

25 B.4- Cable winding section
C- Packaging section

The cables (6) coming from the isolation lines after the completion of their production are in a state wound onto the reels (4) with a diameter between 1000 mm and 2000 mm. The cables (5) in a wound state onto the big reels (4) are delivered to the cable winding section (Figure-5) via the motor unloader (Figure-2).
In the cable winding section, the cable (6) is conveyed to the packaging section (Figure-19), with the desired length and in a state wound onto the coil or reel (4) and with the terminal end thereof being fixed.

In the packaging section (Figure-19), in the cable winding section (Figure-5) the obtained coil (55) or, if desired, the reel (45) is wrapped around with a polyethylene film.

In the motor unloading section (Figure-2), the cable (6), which is wound onto the reels (4) with a diameter between 1000 mm and 2000 mm, is unwound by means of rotation in a direction opposite the rotation of winding, depending on the operating speed of the cable winding section (Figure-6).

The big reel (4) is compressed between the two centers (5), by means of the apparatus (2) with two teeth one being opened in a manner opposite to the other.

The big reel (4) compressed between the two centers (5) is raised and its contact with the ground is eliminated, with the help of the hydraulic piston (1). Depending on the speed of the cable winding section, the big reel (4) is rotated in the direction of rotation (4A) of the reel, by means of a motor (3) whose speed is controllable.

The function of the mechanical accumulator section (Figure-3) is to adjust the speed of the motor unloader (Figure-2), depending on the rotational speed of the cable winding head. A plurality of pulleys, which rotate independent of one another and bear the openings through which the cable (6) may pass, are mounted on the same shaft to form the pulley group (10, 11). Said pulley groups (10, 11) are mounted on a horizontal body (12A). Of said pulley groups (10, 11), the first (10) and the second one (11) are mounted respectively on the fixed slides (18) and on the horizontal body-mounted slides (12), so that they can rotate in the direction of 12B.

The orientation of the cable (6) is altered by means of the pulley (9), in order to enter the first pulley of the mobile group (11). The cable (6) is passed sequentially through all the pulleys in the fixed pulley group (10) and the mobile pulley group (11), and then is submitted to the cable winding section (Figure-5) over the last reel of the fixed pulley group (10). During the operation of the machine, this group moves in the direction of 12B, storing about 50 meters of cable (6) and unloading the same. The amount of cable
which the winding head needs throughout the winding period is very variable. It is not possible for the motor unloader (Figure-2), that feeds the cable (6) to the system, to operate according to the instant cable (6) need of the winding head (Figure-6). The weight of the reel (4) with the cable (6) wound thereupon, which the motor unloader (Figure-2) must control, is about 2000 kg. For this reason, in such type of machines, there should not be significant speed variations in the rotational movement of the motor unloader in the direction of cable (6) unloading.

Mechanical accumulator (Figure-3) enables the motor unloader (Figure-2) to rotate at a fixed speed, by delivering to the system the cable (6) which it has stored upon itself during the first half of the winding period, and by storing upon itself the cable (6), which it will deliver to the system in the next winding period, during the second half of the winding period.

In the cable guiding section (figure-4), the length of the cable (6) coming from the mechanical accumulator (Figure-3) is measured in the units of meter, the outer surface of the cable (6) is checked for recess and the protuberance, and the orientation of the cable (6) is changed.

The cable (6) coming from the mechanical accumulator (Figure-3) enters the pulley (15) that measures the cable (6) length in meters. In order to perform an accurate measurement, the cable (6) is required to rotate together with the measurement pulley (15). Therefore, the cable (6) is pressed down onto the measurement pulley (15) by means of the pressure pulley (14). The cable (6) leaving the measurement section enters the lump detector (16). Lump detector (16) detects the defects on the outer sheath of the cable (6). The cable (6) finally enters the pulley (17), which changes the movement orientation of the cable (6).

The duty of the travers group (proper cable winding apparatus) is to properly align the cable (6) side by side and on top of each other in the winding head (Figure-6), to cut the cable (6) that has reached the packaging length and to secure the cut end onto the package so that it will not become unwound.

The cable (6) passes through the holding and releasing section (27), the pipe (25) with back and forth motion and the cutting head (24), and it enters the winding head (Figure-
6. The holding and releasing section (27) is in a holding state, in order to ensure that the cable (6) will not slip backwards when the speed of the winding head is zero, in other words, in case of stopping. The cable (6) is submitted to the winding head (Figure-6), with the aid of a piston (26).

The winding head (figure-6) consists of the reel mode head actuating group (41) and the coil mode head actuating group (42). These two actuating groups are accommodate together in the winding head. The reel head (48) is located inside the coil head (47). By means of the PLC-controlled screen, the desired winding mode is selected. The head corresponding to the selected winding mode is actuated. When the reel mode is selected, only the reel mode actuating group (41) and the reel head (48) which is connected to the same are actuated. When the coil mode is selected, both the coil head (47) and the reel head (48) inside it are lowered to start the winding process. With the winding head (Figure-6) beginning to rotate, the holding and the releasing section (27) releases the cable (6), and the travers group (Figure-5) begins moving up and down on the slides (18) attached to the fixed base, depending on the diameter of the cable (6). In order to balance the total weight of the travers group (Figure-5), the use is made of the counter weights (28). 1-2 meters before the cable (6) package on the winding head (Figure-6) reaches the desired length, the piston (19) moving the stretch film cutting and holding group (20) moves towards the winding head (in the direction of the arrow) (Figure-5). Once the piston (19) has completed its movement, the stretch film roll (22) rotates about the cutting head (24) (Figure-16), in order to wrap the stretch film (7) around the cable (6) and to deliver the end of the stretch film to the cable package. When the cable package on the winding head reaches the desired length (100 meters, 50 meters, etc.), the blade piston (23) inside the travers group (Figure-5) is actuated and cuts the cable (6). The winding head (Figure-6) rotates for some more time to enable the stretch film (7) to be wrapped onto the whole surface of the cable (6) package. Once the wrapping process is complete for the stretch film (7), the piston (19) is actuated. In the next step, the stretch film holding piston (21) is actuated to hold and cut the stretch film (7). Finally, the piston (19) moves in a direction opposite to the direction of the arrow (Figure-15) such that the stretch holding and cutting head (20) is returned to the initial position in a state holding the stretch film (7).

The coils and the reels obtained at the end of the wrapping process are transferred to the shrink input band by means of the outlet conveyor. The coils (55) and the reels (45)
wrapped on the outside thereof with the stretch film are covered with the shrink nylon (polyethylene film) (51) with size in harmony with the coil (55) and the reel (45) size. Owing to the heat tunnel (53) with height and width in compliance with the size of the coil (55) and the reel (45), the cable (6) wound in the form of a coil (55) or reel (45) is made into a durable package.

At the end of the shrinking section is the rubbing unit, which rubs and eliminates the protuberances on the side surface of the coil (55). If desired, an introductory label may be wrapped onto the coil (55), along with the shrink nylons (51).
CLAIMS

1- The invention relates to a cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine characterized in that it serves to properly align the cable (6) side by side and on top of each other on the winding head, to cut the cable (6) that has reached the packaging length and to secure the cut end onto the package so that it will not become unwound.

2- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that it comprises the reel mode head actuating group (41) and the coil mode head actuating group (42) that actuate the winding head, and the reel mode head (48) and the coil mode head (47) that are connected to said groups (41, 42), are located inside the winding head, are actuated with the aid of the PLC-controlled screen and are disposed one within the other.

3- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that when the reel mode is selected with the help of the PLC-controlled screen, the reel mode actuating group (41) and the reel head (48) connected to the same move downwards, and when the coil mode is selected, the coil mode head actuating group (42) is lowered together with the reel mode head actuating group (41) and also with both the coil head (47) and the reel head (48) located within the same, in order to start the winding process.

4- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that 1-2 meters before the cable (6) package on the winding head reaches the desired length, the stretch roll (22) rotates about the cutting head (24) to wrap the stretch film (7) around the cable (6) upon the movement of the piston (19) that actuates the stretch cutting and holding group (20), and when the cable package on the winding head reaches the desired length (100 meters, 50 meters, etc.), the blade piston (23) inside the travers group is actuated and cuts the cable (6).

5- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in
that after the cable (6) is cut, the winding head rotates for some more time to enable the stretch film (7) to be wrapped around the whole surface of the cable (6) package, and once the winding process is complete, the piston (19) moving the stretch cutting and holding group and also the stretch holding piston (21) connected to the same are actuated, in order to hold down and cut the stretch film (7).
1- The invention relates to a cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine, which is comprised of the motor unloading section in which the cable (6) is unwound by means of rotation in a direction opposite the rotation of winding, depending on the operating speed of the cable winding section; the mechanical accumulator section whose function is to adjust the speed of motor unloader, depending on the rotational speed of the cable winding head; the cable guiding section in which the length of the cable (6) coming from the mechanical accumulator is measured in the units of meter, the outer surface of the cable (6) is checked for recess and the protuberance and the orientation of the cable is changed; the traverse section whose duty is to properly align, cut the cable (6) and secure the cut end onto the package; the cable winding section which consists of the reel mode head (41) actuating group and the coil mode head actuating group (42) that are selected by means of the PLC-controlled screen and the packaging section by which the cable (6) is wrapped with the stretch film (7); characterized in that it serves to properly align the cable (6) side by side and on top of each other on the winding head, to cut the cable (6) that has reached the packaging length and to secure the cut end onto the package so that it will not become unwound,

2- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that it comprises the reel mode head actuating group (41) and the coil mode head actuating group (42) that actuate the winding head, and the reel mode head (48) and the coil mode head (47) that are connected to said groups (41, 42), are located inside the winding head, are actuated with the aid of the PLC-controlled screen and are disposed one within the other.

3- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that when the reel mode is selected with the help of the PLC-controlled screen, the reel mode actuating group (41) and the reel head (48) connected to the same move downwards, and when the coil mode is selected, the coil mode head actuating group (42) is lowered together with the reel mode head actuating group (41) and also with
both the coil head (47) and the reel head (48) located within the same, in order to start the winding process.

4- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that 1-2 meters before the cable (6) package on the winding head reaches the desired length, the stretch roll (22) rotates about the cutting head (24) to wrap the stretch film (7) around the cable (6) upon the movement of the piston (19) that actuates the stretch cutting and holding group (20), and when the cable package on the winding head reaches the desired length (100 meters, 50 meters, etc.), the blade piston (23) inside the travers group is actuated and cuts the cable (6).

5- The cable packaging machine that enables the coil type and reel type packaging operations to be performed on a single machine according to Claim 1 characterized in that after the cable (6) is cut, the winding head rotates for some more time to enable the stretch film (7) to be wrapped around the whole surface of the cable (6) package, and once the winding process is complete, the piston (19) moving the stretch cutting and holding group and also the stretch holding piston (21) connected to the same are actuated, in order to hold down and cut the stretch film (7).
## INTERNATIONAL SEARCH REPORT

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. B65H54/02 B65H54/56 B65H65/00 B21C47/12 B21C47/26

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

B65H B21C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and where practical search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Date of the actual completion of the international search

2 July 2008

Date of mailing of the international search report

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