A positioning apparatus is disclosed for selectively positioning a tubular core (12) axially relative to a core tube (14), the tubular core (14) supporting a web (16) wound thereon. The positioning apparatus includes an elongate housing (18) which defines a bore (20) having a first (22) and a second (24) extremity. The bore (20) receives coaxially therein an end of the core tube (14). A clamp (28) is secured to the end of the core tube (14) which is disposed within the bore (20). The clamp (28) is also secured to the elongate housing (18) for permitting axial movement of the elongate housing (18) relative to the clamp (28). A drive (30) is connected to the elongate housing (28), the drive (30) being drivingly connected to the clamp (28). The arrangement is such that when the drive (30) is rotated to a first location thereof relative to the clamp (28), the elongate housing (18) is disposed in a first axial disposition thereof relative to the clamp (28) so that the elongate housing (18) abuts against and positions the tubular core (12) axially relative to the core tube (14) for permitting winding of the web (16) onto the tubular core (14). However, when the drive (30) is further rotated to a second location thereof relative to the clamp (28), the elongate housing (18) is disposed in a second axial disposition thereof relative to the clamp (28). The second axial disposition of the elongate housing (18) is axially away from the tubular core (12) which is rotatably supported by the core tube (14).
Title: A positioning apparatus for selectively positioning a tubular core axially relative to a core tube.

Background of the invention.

Field of the invention.

The present invention relates to a positioning apparatus for selectively positioning a tubular core axially relative to a core tube.

More specifically, the present invention relates to a positioning apparatus for selectively positioning a tubular core axially relative to a core tube, the tubular core supporting a web wound thereon.

Background information.

In the paper making industry, a wound web of paper can be in the region of 40 feet wide with a diameter of more than 6 feet.

Subsequently, these large rolls of paper are slit and rewound into smaller reels of paper approximately 3 feet in width by 4 feet in diameter for the printing industry and the like.

Also, the aforementioned 40 feet wide rolls of paper, such as tissue paper are rewound to form domestic paper towels or toilet rolls and the like. For example, in order to make rolls of domestic paper towel, the web from a wound reel is unwound and is slit into a plurality of for example 12 inch wide rolls by rotary slitters spaced axially relative to each other. The slit web of tissue paper is attached to a cardboard tubular core which is rotatably supported by a stationary metal core tube. The leading edge of the slit web is attached to the cardboard tube by a gluing
mechanism. A rotating winder roll frictionally engages the outer surface of the cardboard tubular core and rotates the tubular core about the stationary core tube so that the tissue web attached to the tubular core is wound onto the tubular core. When a predetermined amount of the web has been wound onto the tubular core, a mechanism is activated for removing the tubular core and wound web thereon from the core tube.

During the winding operation, it is important that adjacent tubular cores are not loaded axially against each other to such an extent that the winding of the paper web thereon is compromised. Ideally, adjacent tubular cores are loaded axially relative to each other so that although the edges thereof abut against each other, the axial pressure is light enough so that if one of the tubular cores were to be restrained against rotation, adjacent tubular cores would still be free to rotate about the core tube. The target is to close the chucks at both axial ends of the core tube so that there is no axial force between the cores that is the adjacent tubular cores. The closing tightness is ideal if you can lift one core out of the set when the chucks are closed.

In the prior art, various means have been disclosed for axially loading the tubular cores including hydraulic means and the like. US Patent No. 7,011,267 discloses an arrangement in which the core chuck is operate by a hydraulic, electric or pneumatic actuator.

However, according to the present invention, the core chuck includes a direct drive driven ball screw assembly which enables friction free opening and closing of the chucks. This system also enables the set of cores (tubular cores) to be positioned on the same centerline as the trim.
For example, if the trim is 14 x 500 mm, at the slitting section the web width is 7000 mm. After the web passes the spreader, there will be about 1 mm between each roll. The total width at the wind-up section is then 14 x 500 + 13 x 1 = 7013 mm. If the cores (tubular cores) are positioned so that one edge is exactly at the correct position, this will means that on one side the roll will be perfect but on the other side the tubular core will stick out 13 mm out of the wound roll. Even if this protrusion of the tubular core is compensated for by the provision of slightly longer tubular cores there will be wound rolls that will have to be rejected. If the tubular cores are placed exactly at the same centerline compared to web, this will means that the center will be perfect and both edges will be acceptable with no rejected wound rolls.

The inventive concept of the present invention includes closing the chucks with an accurately controlled torque motor such as a direct drive motor installed directly on a ball screw assembly. By this arrangement, the clamping force can be controlled without the need for a load cell. However, the present invention also includes an arrangement in which a load cell or strain gauge is used in order to measure the axial pressure and to use such measurement to control operation of the direct drive motor. Also, according to the present invention it is advantageous to provide a control such that when the chucks have been closed it is possible to open the chucks by 0.2 mm. Such .2mm opening assures that there is no axial force between the tubular cores at the beginning of the winding of the web onto the tubular cores.

The present invention does not envisage any need to adjust the axial force because during winding, the most important thing is to keep the set in a correct position in cross machine direction as otherwise the wound rolls will suffer from the problem known in the art as dishing.
Therefore, it is a primary feature of the present invention to provide a positioning apparatus for selectively positioning a tubular core axially relative to a core tube that overcomes the problems associated with the prior art arrangements.

Another feature of the present invention is the provision of a positioning apparatus for selectively positioning a tubular core axially relative to a core tube so that the web is accurately wound onto the tubular core so that the tubular core does not protrude laterally from the wound web.

A further feature of the present invention is the provision of a positioning apparatus for selectively positioning a tubular core axially relative to a core tube that reduces to a minimum any axial frictional force between adjacent tubular cores.

Another feature of the present invention is the provision of a positioning apparatus for selectively positioning a tubular core axially relative to a core tube that uses a direct drive motor for axially positioning adjacent tubular cores.

Other features and advantages of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description of a preferred embodiment of the present invention contained herein.

**Summary of the invention.**
The present invention relates to a positioning apparatus for selectively positioning a tubular core axially relative to a core tube, the tubular core supporting a web wound thereon. The positioning apparatus includes an elongate housing which defines a bore having a first and a second extremity. The bore receives coaxially therein an end of the core tube. A clamp is secured to the end of the core tube which is disposed within the bore. The clamp is also secured to the elongate housing for permitting axial movement of the elongate housing relative to the clamp. A drive is connected to the elongate housing, the drive being drivingly connected to the clamp. The arrangement is such that when the drive is rotated to a first location thereof relative to the clamp, the elongate housing is disposed in a first axial disposition thereof relative to the clamp so that the elongate housing abuts against and positions the tubular core axially relative to the core tube for permitting winding of the web onto the tubular core. However, when the drive is further rotated to a second location thereof relative to the clamp, the elongate housing is disposed in a second axial disposition thereof relative to the clamp. The second axial disposition of the elongate housing is axially away from the tubular core which is rotatably supported by the core tube.

In a more specific embodiment of the present invention, the elongate housing has a first and a second termination. The first termination of the elongate housing abuts against the tubular core when the drive is disposed in the first disposition thereof.

Also, the positioning apparatus includes a motor which is secured to the housing. The motor is disposed in a vicinity of the second termination of the elongate housing. The motor is drivingly connected to the drive for selectively moving the elongate housing axially between the first and second dispositions thereof.
Moreover, the drive has a first and a second side. The drive defines a threaded surface which extends between the first and second sides of the drive.

Additionally, the threaded surface of the drive cooperates with a threaded portion defined by the clamp. The arrangement is such that when the drive is selectively driven by the motor, the drive is rotated within the end of the core tube so that the threaded surface of the drive cooperates with the threaded portion of the clamp. Accordingly, the drive, motor and elongate housing move axially relative to the clamp.

The first termination of the elongate housing defines an annular collar which abuts against a lateral edge of the tubular core when the elongate housing is disposed in the first disposition thereof.

Additionally, the elongate housing is of tubular configuration.

Also, the bore bearingly receives therein the end of the core tube.

The clamp has a first and a second edge and includes a collar which is disposed in a vicinity of the first edge of the clamp. The collar defines the internal threaded portion.

Additionally, the drive defines the externally threaded surface, the drive extending coaxially through the collar such that the internally threaded portion of the collar threadably cooperates with the externally threaded surface of the drive. The arrangement is such that when the drive is rotated coaxially within the collar, the drive moves axially relative to the clamp.

The clamp includes a head which is disposed in a vicinity of the second edge of the clamp. The head defines at least one channel and a fastener extends through the channel.
Also, the elongate housing includes at least one guide which threadably cooperates with the fastener such that the clamp is secured coaxially within the bore. The bore has a longitudinal slot which cooperates with the guide so that when the drive is rotated, the drive is moved axially relative to the clamp and the guide slides axially within the longitudinal slot. The guide and slot thereby permit axial movement of the elongate housing relative to the clamp while inhibiting rotational movement of the elongate housing relative to the clamp.

The drive is disposed coaxially within the core tube and the bore.

Also, the second side of the drive includes a bearing having an inner and an outer race. The inner race is secured to the drive while the outer race is supported within the second extremity of the bore such that relative rotation is permitted between the second side of the drive and the elongate housing.

Moreover, the motor is a direct drive motor and drives the second side of the drive. The motor is secured to the second extremity of the elongate housing.

More specifically, the motor is a reversible drive electric motor.

Additionally, a control is connected to the motor for permitting axial movement of the elongate housing to the first disposition thereof in which the elongate housing abuts against the tubular core. The control permits further axial movement of the elongate housing away from the tubular core to a further disposition thereof. The further disposition is within a range .1 to .3mm away from the tubular core so that any friction between adjacent axially spaced tubular cores is minimized.

In a preferred embodiment of the present invention, the further disposition is .2mm away from the tubular core.
Many modifications and variations of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description contained hereinafter taken in conjunction with the annexed drawings which show a preferred embodiment of the present invention. However, such modifications and variations fall within the spirit and scope of the present invention as defined by the appended claims.

**Brief description of the drawings.**

Fig. 1 is side elevational view of a positioning apparatus according to the present invention for selectively positioning a tubular core axially relative to a core tube, the tubular core supporting a web wound thereon;

Fig. 2 is a sectional view taken on the line 2-2 of Fig. 1:

Fig. 3 is a similar view to that shown in Fig. 2 but shows the elongate housing moved axially relative to the core tube;

Fig. 4 is a similar view to that shown in Figs. 2 and 3 but shows the elongate housing in a further disposition thereof; and

Fig. 5 is a perspective view of the positioning apparatus shown in Figs. 1-4; and

Fig. 6 is a perspective view of the apparatus shown in Figs. 1-5 but on a smaller scale in order to show adjacent tubular cores and the adjacent rolls of the web wound thereon.

Similar reference characters refer to similar parts throughout the various views of the drawings.

**Detailed description of the drawings.**
Fig. 1 is side elevational view of a positioning apparatus generally designated 10 according to the present invention for selectively positioning a tubular core 12 axially relative to a core tube 14. The tubular core supports a web 16 wound thereon. As shown in Fig. 1, the positioning apparatus 10 includes an elongate housing 18.

Fig. 2 is a sectional view taken on the line 2-2 of Fig. 1. As shown in Fig. 2, the elongate housing 18 defines a bore 20 having a first and a second extremity 22 and 24 respectively. The bore 20 receives coaxially therein an end 26 of the core tube 14. A clamp generally designated 28 is secured to the end 26 of the core tube 14 which is disposed within the bore 20. The clamp 28 is also slidably secured to the elongate housing 18 for permitting axial movement as indicated by the arrow 29 of the elongate housing 18 relative to the clamp 28. A drive 30 is connected to the elongate housing 18, the drive 30 being drivingly connected to the clamp 28. The arrangement is such that when the drive 30 is rotated as indicated by the arrow 31 to a first location thereof relative to the clamp 28 as shown in Fig. 2, the elongate housing 18 is disposed in a first axial disposition thereof relative to the clamp 28 so that the elongate housing 18 abuts against and positions the tubular core 12 axially relative to the core tube 14 for permitting winding of the web 16 onto the tubular core 12.

Fig. 3 is a similar view to that shown in Fig. 2 but shows the elongate housing 18 moved axially as indicated by the arrow 29 relative to the core tube 14. As shown in Fig. 3, when the drive 30 is further rotated as indicated by the arrow 31 to a second location thereof as shown in Fig. 3, relative to the clamp 28, the elongate housing 18 is disposed in a second axial disposition thereof relative to the clamp 28. The second axial disposition of the elongate housing 18 is axially away from the tubular core 12 which is rotatably supported by the core tube 14.
In a more specific embodiment of the present invention, the elongate housing 18 has a first and a second termination 32 and 34 respectively. The first termination 32 of the elongate housing 18 acts as a chuck and abuts against the tubular core 12 when the drive 30 is disposed in the first disposition thereof as shown in Fig. 2.

Also, the positioning apparatus 10 includes a motor 36 which is secured to the elongate housing 18. The motor 36 is disposed in a vicinity of the second termination 34 of the elongate housing 18. The motor 36 is drivingly connected to the drive 30 for selectively moving the elongate housing axially between the first and second dispositions thereof as indicated by the arrow 29.

Moreover, the drive 30 has a first and a second side 38 and 40 respectively. The drive 30 defines a threaded surface 42 which extends between the first and second sides 38 and 40 of the drive 30.

Additionally, the threaded surface 42 of the drive 30 cooperates with a threaded portion 44 defined by the clamp 28. The arrangement is such that when the drive 30 is selectively driven by the motor 36, the drive 30 is rotated as shown by the arrow 29 within the end 26 of the core tube 14 so that the threaded surface 42 of the drive 30 cooperates with the threaded portion 44 of the clamp 28. Accordingly, the drive 30, motor 36 and elongate housing 18 move axially relative to the clamp 28 as indicated by the arrow 29.

The first termination 32 of the elongate housing 18 defines an annular collar 46 which abuts against a lateral edge 48 of the tubular core 12 when the elongate housing 18 is disposed in the first disposition thereof as shown in Fig. 2.

Additionally, the elongate housing 18 is of tubular configuration.
Also, the bore 20 bearly receives therein the end of the core tube 14.

The clamp 28 has a first and a second edge 50 and 52 respectively and includes a collar 54 which is disposed in a vicinity of the first edge 50 of the clamp 28. The collar 54 defines the 1 threaded portion 44 which is an internally threaded portion.

Additionally, the drive 30 defines the externally threaded surface 42, the drive 30 extending coaxially through the collar 54 such that the internally threaded portion 44 of the collar 54 threadably cooperates with the externally threaded surface 42 of the drive 30. The arrangement is such that when the drive 30 is rotated coaxially within the collar 54 as indicated by the arrow 31, the drive 30 moves axially relative to the clamp 28 as indicated by the arrow 29.

The clamp 28 includes a head 58 which is disposed in a vicinity of the second edge 52 of the clamp 28. The head 58 defines at least one channel 60 as shown in Fig. 2 and a fastener 62 extends through the channel 60.

Also, the elongate housing 18 includes at least one guide 64 which threadably cooperates with the fastener 62 such that the clamp 28 is secured coaxially within the bore 20. The bore 20 has a longitudinal slot 66 which cooperates with the guide 64 so that when the drive 30 is rotated as indicated by the arrow 31, the drive 30 is moved axially relative to the clamp 28 as indicated by the arrow 29 and the guide 64 slides axially within the longitudinal slot 66. The guide 64 and longitudinal slot 66 thereby permit axial movement of the elongate housing 18 relative to the clamp 28 as indicated by the arrow 29 while inhibiting rotational movement of the elongate housing 18 relative to the clamp 28.

The drive 30 is disposed coaxially within the core tube 14 and the bore 20.
Also, as shown in Fig. 3, the second side 40 of the drive 30 includes a bearing 68 having an inner and an outer race 70 and 72 respectively. The inner race 70 is secured to the drive 30 while the outer race 72 is supported within the second extremity 24 of the bore 20 such that relative rotation is permitted between the second side 40 of the drive 30 and the elongate housing 18 as indicated by the arrow 31.

Moreover, the motor 36 is a direct drive motor and drives the second side 40 of the drive 30. The motor 36 is secured to the second extremity 24 of the elongate housing 18.

More specifically, the motor 36 is a reversible direct drive electric motor.

Additionally, a control 74 is connected to the motor 36 for permitting axial movement of the elongate housing 18 to the first disposition thereof in which the elongate housing 18 abuts against the tubular core 12.

Fig. 4 is a similar view to that shown in Figs. 2 and 3 but shows the elongate housing 18 in a further disposition thereof. As shown in Fig. 4, the control 74 permits further axial movement of the elongate housing 18 away from the tubular core 12 as indicated by the arrow 29 to a further disposition thereof. The further disposition of the elongate housing 18 is within a range .1 to .3mm away from the tubular core 12 so that any friction between adjacent axially spaced tubular cores 12 is minimized.

In a preferred embodiment of the present invention, the further disposition FD is .2mm away from the tubular core 12.

Fig. 5 is a perspective view of the positioning apparatus 10 shown in Figs. 1-4.
Fig. 6 is a perspective view of the apparatus shown in Figs. 1-5 but on a smaller scale in order to show adjacent tubular cores 12 and the adjacent rolls of the web 16 wound thereon.

In operation of the apparatus 10 according to the present invention, after the tubular cores 12 are rotatably supported by the core tube 14, the control 74 energizes the direct drive electric motor 36 so that the drive 30 rotates. Because the clamp 28 is secured to the end 26 of the core tube 14, lateral (axial) movement of the clamp is inhibited. Therefore, the drive, motor, and elongate housing 30, 36 and 18 respectively are moved so that the annular collar 46 of the elongate housing 18 abuts against the lateral edge 48 of the tubular core 12 as shown in Fig. 2.

The control 74 then energizes the motor 36 but in the reverse direction so that the annular collar 46 moves away slightly by .2mm from the lateral edge 48 of the tubular core. Such reverse movement to the further disposition FD of the elongate housing 18 and the annular collar 46 defined by the elongate housing 18 ensures that axial frictional force between adjacent lateral edges of the tubular cores 12 is minimized so that the web 16 can be uniformly wound onto the tubular cores 12 without having the tubular core 12 protruding laterally from the wound web 16.

The apparatus according to the present invention provides a unique arrangement for accurately and reliably winding a web onto a core so that rejection of resultant core wound webs is minimized.

Glossary

10 positioning apparatus.
12 tubular core.
14 core tube.

16 web.

18 elongate housing.

20 bore.

22 first extremity of 20.

24 second extremity of 20.

26 an end of 14.

28 clamp.

29 arrow.

30 drive.

31 arrow.

32 first termination of 18.

34 second termination of 18.

36 motor

38 first side of 30.

40 second side of 30.

42 threaded surface of 30.

44 threaded portion of 28.
46 annular collar of 32.

48 lateral edge of 12.

50 first edge of 28

52 second edge of 28

54 collar

56 internally threaded portion.

58 head of 28.

60 channel.

62 fastener.

64 guide.

66 longitudinal slot of 20.

68 bearing

70 inner race of 68.

72 outer race of 68.

74 control.
**What is claimed is:**

1. A positioning apparatus for selectively positioning a tubular core axially relative to a core tube, said tubular core supporting a web wound thereon, said positioning apparatus comprising:

   - an elongate housing defining a bore having a first and a second extremity, said bore receiving coaxially therein an end of the core tube;
   - a clamp secured to the end of the core tube disposed within said bore, said clamp also being secured to said elongate housing for permitting axial movement of said elongate housing relative to said clamp; and
   - a drive connected to said elongate housing, said drive being drivingly connected to said clamp such that when said drive is rotated to a first location thereof relative to said clamp, said elongate housing is disposed in a first axial disposition thereof relative to said clamp so that said elongate housing abuts against and positions the tubular core axially relative to said core tube for permitting winding of the web onto the tubular core and when said drive is further rotated to a second location thereof relative to said clamp, said elongate housing is disposed in a second axial disposition thereof relative to said clamp, said second axial disposition of said elongate housing being axially away from the tubular core which is rotatably supported by the core tube.

2. A positioning apparatus as set forth in claim 1 wherein

   - said elongate housing has a first and a second termination, said first termination of said elongate housing abutting against the tubular core when said drive is disposed in said first disposition thereof;

   - said positioning apparatus further including:
a motor secured to said elongate housing and disposed in a vicinity of said second termination of said elongate housing, said motor being drivingly connected to said drive for selectively moving said elongate housing axially between said first and second dispositions thereof.

3. A positioning apparatus as set forth in claim 1 wherein

said drive has a first and a second side, said drive defining a threaded surface which extends between said first and second sides of said drive;

said threaded surface of said drive cooperating with a threaded portion defined by said clamp so that when said drive is selectively driven by said motor, said drive is rotated within the end of the core tube so that said threaded surface of said drive cooperates with said threaded portion of said clamp such that said drive, motor and elongate housing move axially relative to said clamp.

4. A positioning apparatus as set forth in claim 1 wherein

said first termination of said elongate housing defines an annular collar which abuts against a lateral edge of the tubular core when said elongate housing is disposed in said first disposition thereof.

5. A positioning apparatus as set forth in claim 1 wherein

said elongate housing is of tubular configuration.

6. A positioning apparatus as set forth in claim 1 wherein

said bore bearingly receives therein the end of the core tube.

7. A positioning apparatus as set forth in claim 1 wherein

said clamp has a first and a second edge;
said clamp including:

a collar disposed in a vicinity of said first edge of said clamp;

said collar defining an internal threaded portion;

said drive defining an externally threaded surface, said drive extending coaxially through said collar such that said internally threaded portion of said collar threadably cooperates with said externally threaded surface of said drive so that when said drive is rotated coaxially within said collar, said drive moves axially relative to said clamp.

8. A positioning apparatus as set forth in claim 7 wherein

said clamp includes:

10 a head disposed in a vicinity of said second edge of said clamp;

said head defining at least one channel;

a fastener extending through said channel;

said elongate housing including:

at least one guide threadably cooperating with said fastener such that said clamp is secured coaxially within said bore, said bore having a longitudinal slot which cooperates with said guide so that when said drive is rotated, said drive is moved axially relative to said clamp and said guide slides axially within said longitudinal slot, said guide and slot permitting axial movement of said elongate housing relative to said clamp while inhibiting rotational movement of said elongate housing relative to said clamp.

9. A positioning apparatus as set forth in claim 1 wherein
said drive is disposed coaxially within said core tube and said bore.

10. A positioning apparatus as set forth in claim 3 wherein

said second side of said drive includes:

a bearing having an inner and an outer race;

said inner race being secured to said drive, said outer race being supported within said second extremity of said bore such that relative rotation is permitted between said second side of said drive and said elongate housing.

11. A positioning apparatus as set forth in claim 2 wherein

said motor is a direct drive motor.

12. A positioning apparatus as set forth in claim 11 wherein

said direct drive motor drives said second side of said drive, said motor being secured to said second extremity of said elongate housing.

13. A positioning apparatus as set forth in claim 12 wherein

said motor is a reversible direct drive electric motor.

14. A positioning apparatus as set forth in claim 2 further including:

a control connected to said motor for permitting axial movement of said elongate housing to said first disposition thereof in which the elongate housing abuts against the tubular core, said control permitting further axial movement of said elongate housing away from the tubular core to a further disposition thereof, said further disposition being within a range .1 to .3 mm away from the core tube so that any friction between adjacent axially spaced tubular cores is minimized.
15. A positioning apparatus as set forth in claim 14 wherein

said further disposition is .2mm away from the tubular core.

16. A positioning apparatus for selectively positioning a tubular core axially relative to a core tube, said tubular core supporting a web wound thereon, said positioning apparatus comprising:

an elongate housing defining a bore having a first and a second extremity, said bore receiving coaxially therein an end of the core tube;

a clamp secured to the end of the core tube disposed within said bore, said clamp also being slidably secured to said elongate housing for permitting axial movement of said elongate housing relative to said clamp;

a drive connected to said elongate housing, said drive being drivingly connected to said clamp such that when said drive is rotated to a first location thereof relative to said clamp, said elongate housing is disposed in a first axial disposition thereof relative to said clamp so that said elongate housing abuts against and positions the tubular core axially relative to said core tube for permitting winding of the web onto the tubular core and when said drive is further rotated to a second location thereof relative to said clamp, said elongate housing is disposed in a second axial disposition thereof relative to said clamp, said second axial disposition of said elongate housing being axially away from the tubular core which is rotatably supported by the core tube; and

a reversible direct drive electric motor drivingly connected to said drive.

17. A positioning apparatus for selectively positioning a tubular core axially relative to a core tube, said tubular core supporting a web wound thereon, said positioning apparatus comprising:
an elongate housing defining a bore having a first and a second extremity, said bore receiving coaxially therein an end of the core tube;

a clamp secured to the end of the core tube disposed within said bore, said clamp also being slidably secured to said elongate housing for permitting axial movement of said elongate housing relative to said clamp;

a drive connected to said elongate housing, said drive being drivingly connected to said clamp such that when said drive is rotated to a first location thereof relative to said clamp, said elongate housing is disposed in a first axial disposition thereof relative to said clamp so that said elongate housing abuts against and positions the tubular core axially relative to said core tube for permitting winding of the web onto the tubular core and when said drive is further rotated to a second location thereof relative to said clamp, said elongate housing is disposed in a second axial disposition thereof relative to said clamp, said second axial disposition of said elongate housing being axially away from the tubular core which is rotatably supported by the core tube;

said elongate housing has a first and a second termination, said first termination of said elongate housing abutting against the tubular core when said elongate housing is disposed in said first disposition thereof;

a motor secured to said elongate housing and disposed in a vicinity of said second termination of said elongate housing, said motor being drivingly connected to said drive for selectively moving said elongate housing axially between said first and second dispositions thereof;

said drive having a first and a second side, said drive defining a threaded surface which extends between said first and second sides of said drive;
said threaded surface of said drive cooperating with a threaded portion defined by said clamp so that when said drive is selectively driven by said motor, said drive is rotated within the end of the core tube so that said threaded surface of said drive cooperates with said threaded portion of said clamp such that said drive, motor and elongate housing move axially relative to said clamp;

said first termination of said elongate housing defines an annular collar which abuts against a lateral edge of the tubular core when said elongate housing is disposed in said first disposition thereof;

said elongate housing is of tubular configuration;

said bore bearingly receives therein the end of the core tube;

said clamp has a first and a second edge;

said clamp including:

a collar disposed in a vicinity of said first edge of said clamp;

said collar defining an internal threaded portion;

said drive defining an externally threaded surface, said drive extending coaxially through said collar such that said internally threaded portion of said collar threadably cooperates with said externally threaded surface of said drive so that when said drive is rotated coaxially within said collar, said drive moves axially relative to said clamp;

said clamp including:

a head disposed in a vicinity of said second edge of said clamp;

said head defining at least one channel;
a fastener extending through said channel;
said elongate housing including:
at least one guide threadably cooperating with said fastener such that said clamp is secured coaxially within said bore, said bore having a longitudinal slot which cooperates with said guide so that when said drive is rotated, said drive is moved axially relative to said clamp and said guide slides axially within said longitudinal slot, said guide and slot permitting axial movement of said elongate housing relative to said clamp while inhibiting rotational movement of said elongate housing relative to said clamp;
said drive being disposed coaxially within said core tube and said bore;
said second side of said drive including:
a bearing having an inner and an outer race;
said inner race being secured to said drive, said outer race being supported within said second extremity of said bore such that relative rotation is permitted between said second side of said drive and said elongate housing;
said motor being a direct drive motor;
said direct drive motor driving said second side of said drive, said motor being secured to said second extremity of said elongate housing; and
a control connected to said motor for permitting controlled axial movement of said elongate housing to said first disposition thereof in which the elongate housing abuts against the tubular core, said control permitting controlled further axial movement of said elongate housing away from the tubular core to a further disposition thereof, said further disposition being within a
range .1 to .3mm away from the tubular core so that any friction between adjacent axially spaced tubular cores is minimized.
Fig. 4.
Fig. 5.
### A. CLASSIFICATION OF SUBJECT MATTER

**INV.** B65H19/22 B65H19/30

**ADD.**

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

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

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

EPO-Internal, WPI Data

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>A</td>
<td>DE 10 2013 102740 Al (BAUMER JOSEF [DE]) 30 October 2014 (2014-10-30) paragraphs [0025] - [0031], [0034], [0037] figures 1-4, 6b</td>
<td>1, 16, 17</td>
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<td>A</td>
<td>US 2004/099761 Al (RECAMI ALBERTO [IT] ET AL) 27 May 2004 (2004-05-27) paragraphs [0027] - [0029], [0035], [0037] - [0038], [0042], [0045] - [0051], [0065] figures 1, 2, 3a, 8</td>
<td>1, 16, 17</td>
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* Further documents are listed in the continuation of Box C. See patent family annex.

**Date of the actual completion of the international search**

27 February 2017

**Date of mailing of the international search report**

07/03/2017

Name and mailing address of the ISA/Authorized officer

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