Jan. 18, 1966 K. VOGT 3,229,924

METHOD AND MACHINE FOR WRAPPING TENSIONED WIRE ABOUT A CONTAINER

Filed March 18, 1963 3 Sheets-Sheet 1

Fig. 1

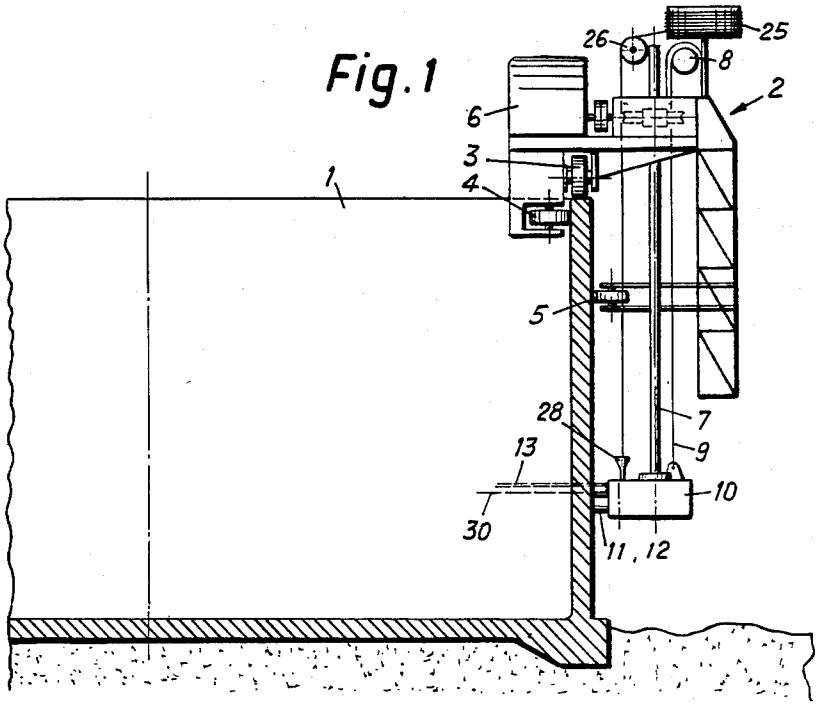
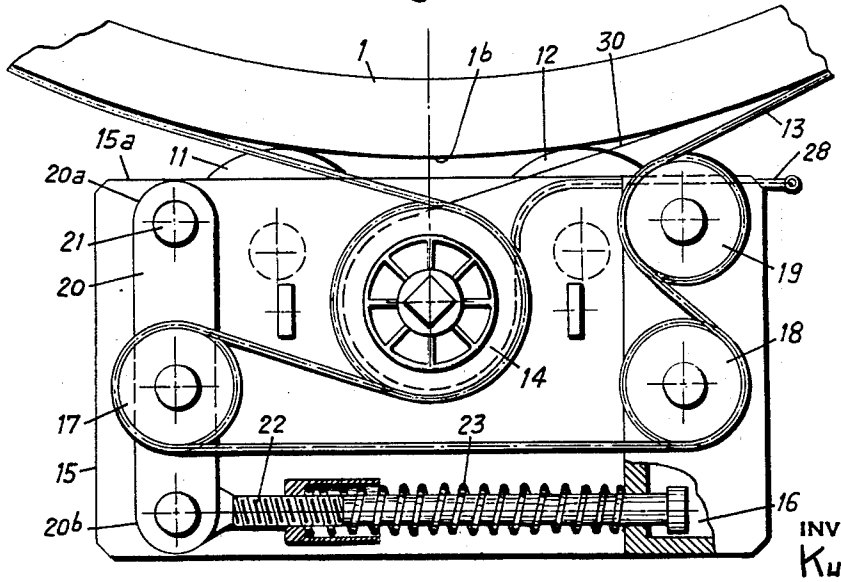


Fig. 2



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Fig.3

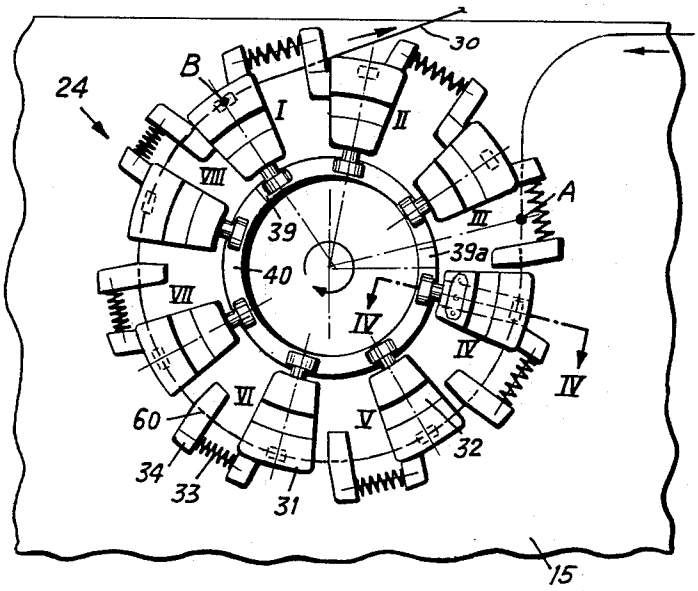
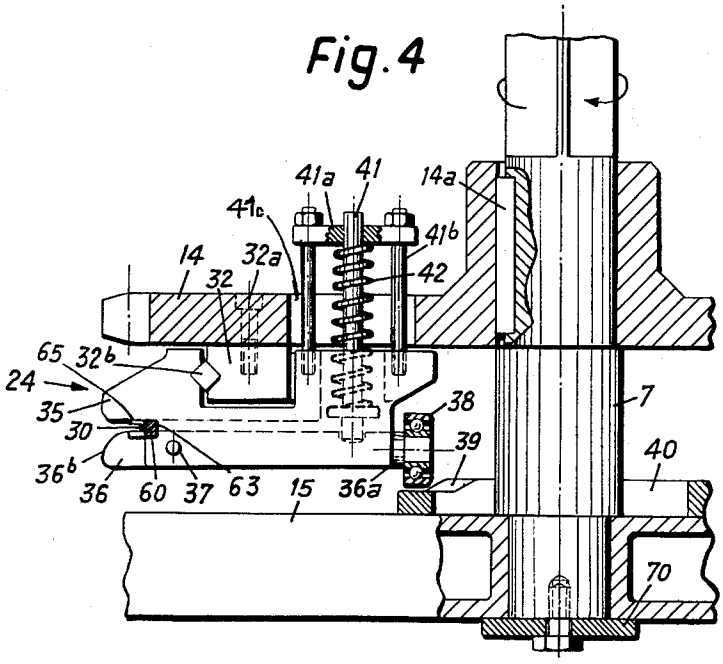


Fig.4



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METHOD AND MACHINE FOR WRAPPING TENSIONED WIRE ABOUT A CONTAINER

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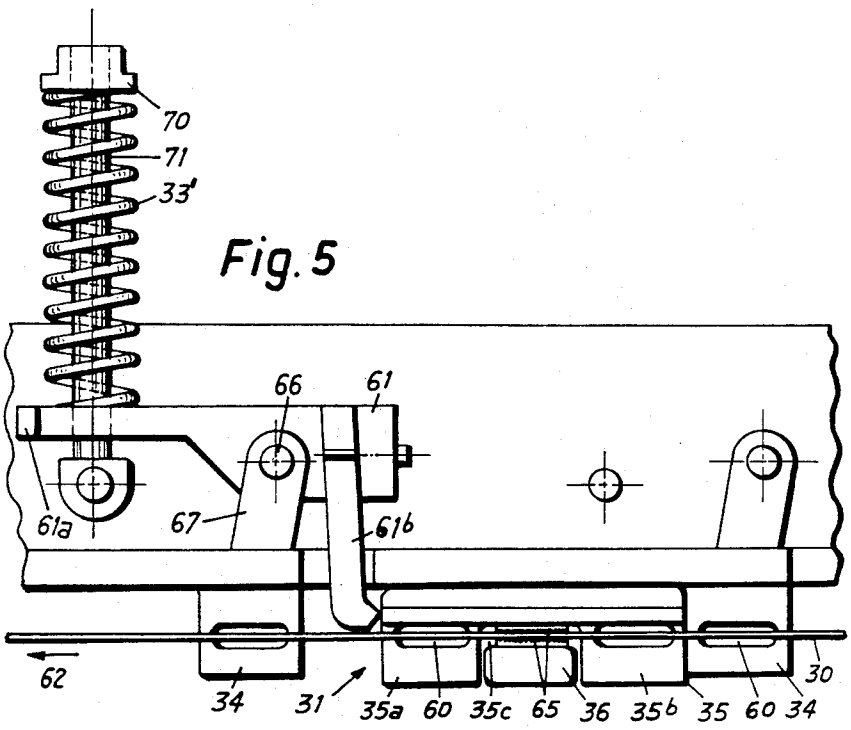


Fig. 5

Fig. 6

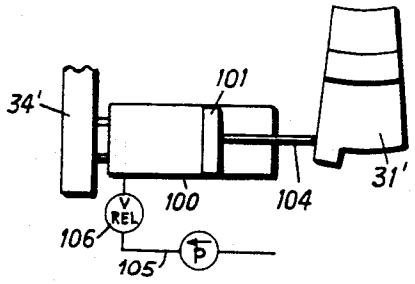
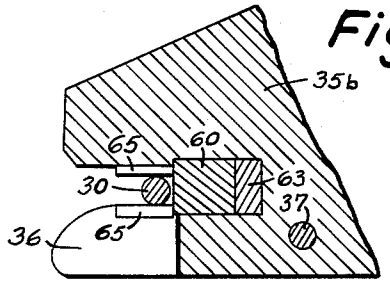


Fig. 4a



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3,229,924

METHOD AND MACHINE FOR WRAPPING TENSIONED WIRE ABOUT A CONTAINER

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Filed Mar. 18, 1963, Ser. No. 265,984
20 Claims. (Cl. 242—7)

The present invention has reference to an improved method and apparatus for wrapping tie means, such as a wire or cable about relatively rigid objects and, in particular, for wrapping vessels or containers such as concrete containers.

It is known to the art to wrap or wind a steel wire which is under a tensile stress about the walls of concrete vessels or containers, preferably of circular cross-section, which containers during service are subjected to an internal pressure, so that a tangential compressive stress is produced in the concrete. In known winding or wrapping machines by means of which such concrete containers are wrapped, a frame circles around the container, wherein a drive member arranged on the frame rolls or rides on an endless transport member wound about the container, whereby a wire unwinding from a winding pulley or sheave is wound or coiled about the container. The wire is thus unwound from a supply spool or drum arranged on the frame, and is delivered to the winding pulley through the agency of guide pulleys and guide tubes, the latter of which are likewise arranged on the frame. In order to achieve a predetermined wrapping wire tension with these known machines, the winding pulley is positively connected through the agency of a slip clutch with the drive member. Such type of wire wrapping machine for containers is disclosed in applicant's U.S. Patent 2,785,866, issued March 19, 1957, entitled, "Machine for Wrapping Concrete Containers With Wire."

A disadvantage with such type of machine resides in the fact that, by virtue of the stretching of the wire due to the wire tension, the wire payed-off the winding pulley—said wire generally being wound about the winding pulley several times—experiences a relative movement with respect to the winding pulley resulting in a rubbing effect causing a very pronounced abrasion or scuffing of said winding pulley. A further disadvantage resides in the fact that, there results a relative movement between the drive member and the winding pulley when the wire tension is exceeded, which causes a pronounced heating of the slip surface of the slip clutch. Such generally necessitates a cooling of such slip surface in order to maintain its wear and tear within economical limits. Additionally, as a result of such wear and tear, the slip or slide torque of the slip coupling must be continually regulated and readjusted.

In contrast thereto, the wrapping machine designed according to the teachings of the present invention is characterized by the fact that, the drive member and winding member are rigidly connected with one another. Furthermore, the winding means or member includes a plurality of peripherally arranged, circularly or angularly spaced, operative clamping means for grasping the wire to be wound about the container at a plurality of spaced locations. These clamping means are constructed to be independently operative with respect to one another, and which during the rotational movement of the winding member are actuatable by operable actuating and control means.

More specifically, a preferred form of machine for winding a wire about a container according to the invention comprises a carriage, drive means for rotating said carriage about said container, a supply source for said wire, and winding means for winding said wire from said supply source about said container. The drive means includes an endless transport member adapted to extend about the container and a drive member engageable with said endless transport member to displace the carriage together with the winding means about said container.

The ratio of the diameter of the drive member for the endless transport member with respect to the winding means is so chosen as to ensure for a given period of time a predetermined difference between the travel of the drive member about the container and the length of wire as measured in its untensioned state wound about the container as the drive member travels about said container, whereby said wire will be applied to said container under predetermined tension. Control means operable with said clamping means periodically open and close the latter as said wire passes the winding means for winding onto said container. The clamping means serve to gradually apply the desired tension to a length of wire collectively grasped by the operating clamping means, with said wire length approximately being defined by a first location where it is seized by a clamp member and a second location where said clamp member releases said wire. Additionally, height-adjusting means for the winding means are provided in order to control and vary the pitch of the coils of the wire wound onto the container.

The method of winding a wire and the like about a container according to the invention generally comprises the steps of: securing one end of a supply of wire supported on a winding apparatus to the container to be wound with such wire, displacing said winding apparatus for movement about said container to continuously draw-off said wire from said wire supply, controlling the length of the displacement path of said winding apparatus about said container relative to the length of wire drawn-off of said wire supply and applied to said container, such that said length of wire applied to said container as measured in its untensioned state is somewhat less than the displaced path of said winding apparatus, to thereby apply a predetermined tension to said wire being wound about said container, clamping said wire at a plurality of spaced locations forwardly of the point of contact of said wire with said container, as such wire moves between an initial point of clamping and a point of release of said clamping, to thereby gradually increase the tension in the length of wire between said clamp and release points up to or approximately to the desired tension with which the wire is to be wound onto said container.

Accordingly, it is an important object of the present invention to provide an improved method and apparatus for wrapping wire or other suitable tie means about a container or other object in a relatively simple and reliable manner.

Another important object of the present invention is to provide an improved method and apparatus for wrapping wire about objects, such as vessels and containers, permitting for gradual tensioning of the wire during wrapping thereof.

Another important object of the present invention is to provide an improved apparatus for tying a wire, cable or other reinforcement means about containers, which comprises means for wrapping the wire about the container including means for incrementally applying wire tension to predetermined lengths of such wire as each such predetermined wire lengths moves between a first location where it is clamped and is in practically tensionless condition, to a second location where such predetermined wire length is unclamped prior to application onto the container.

Another object is the provision of an improved method for wrapping reinforcing tie means to an object, such that

said tie means do not cause substantial rubbing or scuffing of the surface of a wrapping device.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

In the drawings:

FIGURE 1 illustrates a wire wrapping machine designed according to the present invention and arranged on the container to be wrapped;

FIGURE 2 illustrates an enlarged detail of the wire wrapping machine depicted in FIGURE 1;

FIGURE 3 schematically illustrates a fragmentary, sectional plan view of the wire winding devices;

FIGURE 4 is an enlarged, cross-sectional view, taken along lines IV—IV of FIGURE 3;

FIGURE 4*a* is an enlarged, fragmentary sectional view showing details of a clamping means used in the inventive device;

FIGURE 5 is another embodiment of the invention, illustrating details of a modified form of the wire winding means;

FIGURE 6 illustrates a modified form of clamp employing cylinder and piston arrangement to control the wire tension.

Referring now to the drawings and, more particularly, to FIGURES 1–4, it will be recognized that a wheeled chassis or carriage unit **2** is arranged on a concrete container or vessel **1**. The carriage unit **2** is provided with a roller **3** which rides on the upper peripheral edge of the container **1**, a roller **4** which rides on the inner wall of the container **1**, as well as a roller **5** that rides on the outer wall of the container **1**. By means of these rollers the entire carriage unit **2** can revolve or circle about the periphery of the container **1**. In order to facilitate revolving of the wheeled chassis **2** about the container **1** a suitable arm member (not shown) pivotable about approximately the center line of the container may be provided, in a manner taught in applicant's U.S. Patent 2,785,866 previously mentioned. A drive motor **6** is arranged on the carriage unit **2**, by means of which an axially displaceable shaft **7** can be driven through the agency of a suitable transmission or gear unit of conventional construction, and for this reason not further illustrated. Additionally, a cable winch **8** supported by the carriage unit **2** is engageably driven by the drive motor **6** through the intermediary of a further suitable transmission or gear unit of standard construction (not shown). A winding unit **10** is suspended on a winding rope or cable **9** provided for the cable winch **8**.

As best ascertained by briefly referring to FIGURE 4, it will be recognized that the winding unit **10** includes a platform **15** to which the shaft member **7** is rotatably mounted, said shaft member being secured at one end to said platform by an end plate or stop **70**. The shaft member **7** may preferably be of square cross-section, as shown in FIGURE 2. The cable winch **8** forms height-adjusting means which enables the winding unit **10** to be elevationally adjusted parallel to the external container wall **1***b*, in order to wind a wrapping wire **30** or other suitable tie means, with predetermined spacing or pitch between the wound coils, onto the external or outer wall **1***b* of the container **1**. A pair of wheel members **11** and **12**, carried by the platform **15** at the end **15***a* confronting the outer wall **1***b* of the container **1**, serves to brace the winding unit **10** against said outer wall of said container, in a manner best seen by referring to FIGURE 2. The motive drive for the cable winch **8**, when decoupled from the drive motor **6**, can also take place by means of a hand-operated crank for example.

As shown in FIGURE 2, in order to produce a rotational movement of the carriage unit **2** about the concrete container **1**, there is provided a suitable transport member, such as an endless chain **13** which is slung about the outer wall **1***b* of said concrete container. A drive member in the form of a sprocket wheel **14** engages with the endless chain **13**, said sprocket wheel being rigidly connected or keyed at **14***a*, to the shaft member **7** and being driven by said shaft member. The sprocket wheel **14** is located above the platform **15** of the winding unit **10**, as clearly shown in FIGURE 4. The endless transport chain **13** is further guided about guide pulleys **18**, **19** rotatably mounted upon the platform **15** and arranged in a pulley box **16**, as well as being guided about a tensioning sprocket wheel **17**. The tensioning sprocket wheel **17** is rotatably mounted upon a lever member **20** which, in turn, is pivotably supported at its one end **20***a* about a pivot shaft **21** arranged upon the platform **15**, whereas the other end **20***b* of the lever member **20** is articulated to an operating or push rod **22**. This push rod **22** displaceably bears against the force of a coil spring **23**. In this manner, it is possible to properly tension the endless transport chain **13** about the container **1**.

By further referring to FIGURE 4, it will be recognized that a wire or cable winding device or means **24** is provided for the drive member or sprocket wheel **14**. The winding device **24** enables a wire, cable or other suitable tie means **30** to be wound or coiled about the container **1**, as will be more fully described hereinafter. In order to guide the wire **30** to the winding device **24** there is provided on the carriage unit **2** a wire supply source in the form of a pay-off or supply drum **25** which travels around the container **1** together with said carriage unit. If it is desired to relieve the carriage unit **2** of some of its weight, the supply drum **25** could conceivably be arranged elsewhere, as for example on the rotating arm pivotable about the longitudinal axis of the container. The wire **30** paid-off the supply drum **25** is guided downwardly over a guide roller **26** and, then, via a guide tube **28** arranged on the platform **15**, is conducted to the winding device **24**.

As illustrated in FIGURES 3 and 4, on the bottom face of the sprocket wheel **14** there are arranged a number of clamping means or segments **31** which are positively connected with and uniformly, angularly distributed about the periphery of said sprocket wheel. In the illustrated example of FIGURE 3, eight such clamping segments **31** have been shown, by means of which the wire **30** is engaged, and which serve to gradually apply the desired tension to the wire **30**. Each of these clamping segments **31** of the wire winding means **24** is displaceably mounted upon a guide rail member **32** (FIGURE 4), secured by fastening means **32***a* to the underface of the sprocket wheel **14** in the peripheral direction of said sprocket wheel. These clamping segments **31** are displaceably mounted to move against the force of spring members **33**, connected at one of their respective ends to an associated clamping segment **31** and with their other end bear against a stop member **34**. It will be appreciated that one such stop member **34** is always arranged between two adjacent clamping segments **31**. These stop members **34** are likewise located at the periphery of the sprocket wheel **14**.

As FIGURE 4 more clearly shows in detail, each clamp means or segment **31** comprises an upper clamp jaw **35** displaceably connected via member **32***b* to the rail member **32**, as well as being further provided with a lower clamp jaw **36**. The lower clamp jaw **36** is pivotably mounted on the upper clamp jaw **35** about a pivot bolt **37**. By now briefly referring to the embodiment of FIGURE 5, which employs a similarly constructed clamp segment **31**, it will be seen that the lower clamp jaw **36** is disposed in a slot **35***c* formed between end portions **35***a*, **35***b* of the upper clamp jaw **35**. The pivoting of the lower clamp jaw **36** in its opening direction is carried

out by the rotational movement of the sprocket wheel **14**, through the agency of a cam follower or roller member **38** rotatably arranged at the inner end **36***a* of the lower clamp jaw **36**. This cam follower or roller member **38**, during a predetermined angular position of the winding device **24** or the sprocket wheel **14**, rides upon an ascending, inclined cam surface **39** of a control cam or disk **40** rigidly arranged on the platform **15**. Such movement of the cam follower **38** causes pivoting of the lower clamp jaw **36** about its pivot bolt **37** such that the outer or free end **36***b* of the clamp jaw **36** is downwardly displaced into its open position.

The pivotable movement of the lower clamp jaw **36** occurs against the action of a bolt member **41** displaceably mounted in the upper clamp jaw **35**. This bolt member **41** freely extends through slot means **41***c* of sprocket wheel **14** and is normally downwardly displaced under the action of a coil spring **42** and, thus, normally effects a closing movement of the lower clamp jaw **36**. The displacement of the lower clamp jaw **36** into its closing position occurs during a predetermined angular position of the winding device **24** or the sprocket wheel **14**, corresponding to the riding or rolling-off of the cam follower **38** from a descending, inclined cam surface **39***a* provided on the control cam or disk **40**. Due to such, the bolt member **41** presses the lower clamp jaw **36** against the upper clamp jaw **35**, with the result that the wire **30** is securely clamped between the respective clamp jaws **35**, **36** during the wire wrapping operation. Of course, it would also be possible to operatively connect the winding means **24** with the shaft **7** through the intermediary of a separate plate member, rather than directly with the sprocket wheel **14**. It is merely important that normally no relative rotational movement exists between the sprocket wheel **14** and the winding device **24**, with the clamping segments **31** only then shifting when the desired wire tension is exceeded.

It it is now assumed that the winding machine is in operation such that the winding device **24** (FIGURE 3) turns in clockwise direction with the motor driven shaft **7**, then the wire or like tie means **30** disposed adjacent the periphery at the sprocket chain **14** and clamped by a portion of the clamping segments **31** is, on the one hand, drawn-off of the supply drum **25** and, on the other hand, by circling about the concrete container **1** is wrapped or coiled about the latter. Consequently, it is important that the diameter of the winding device **24** or, more specifically, the diameter defined by the clamping portions of the clamp segments **31** be smaller than the pitch diameter of the sprocket wheel **14**, whereby the development path of the sprocket wheel **14** on the chain **13** is larger than the non-tensioned wire length which is simultaneously wound-off of the winding device **24**. In other words, if, for instance, the sprocket wheel **14** performs one revolution, its rolling travel on the chain **13** is greater than the length of the wire **30** as measured in its untensioned state unwound in the same length of time from the winding device **24** and wound about the container **1**. This has the effect that the wire **30** between the winding device **24** and the wall **1***b* of the container **1** is tensioned.

In order to take up this predetermined wire tension, the clamp segments **31** are individually adjustable by varying the loading or tension of the spring members **33** (FIGURE 3). Such can, for example, be achieved by suitable adjusting means provided for the spring members to vary the loading thereof, or else, by replacing such spring members with others exerting the desired force-applying effect. One such possible form of spring load adjusting means is described in the embodiment of FIGURE 5, to be discussed hereinafter. Additionally, the spring members **42** are so adjusted via plate member **41***a* and bolt means **41***b* that the wire **30**, with closed clamp jaws **35** and **36**, does not slip or slide between said clamp jaws, whereby on the one hand, a slipping of the wire between the upper and lower clamp jaws **35**, **36** is prevented and, on the other hand, with increase of the tension of the wire **30** the clamp segments **31** are moved in the direction of rotation on the rail members **32** against the force of the spring members **33**. Consequently, the wire tension cannot increase any further than the adjustable preset spring members **33** permit. As a result, the wire tension can be maintained substantially within desired limits, as will more fully be explained shortly hereinafter.

In FIGURE 5, wherein like reference numerals denote similar elements, there is illustrated a preferred arrangement of a clamping segment **31** provided with stop means **34** and spring member **33'** for absorbing the previously mentioned wire tension. The coil spring **33'** is effective upon the free arm **61***a* of an angle lever **61** which is pivotably mounted about a pivot shaft **66**. The other arm **61***b* of the angle lever **61** bears against the clamping means or segment **31** and presses the latter with a predetermined force, dependent upon the loading or tension of the spring member **33'**, against the stop member **34**. The force-applying effect of the spring **33'** can, for example, be adjusted by axially displacing the collar member **70** along the support shaft **71**. The pivot shaft **66** of each clamping segment **31** is supported by a respective fork member **67**, each of the latter of which are arranged upon one of the stop members **34**. In this embodiment, the wire **31** is clamped between the clamping jaws **35** and **36**. If, now, the force acting upon the wire **30** in the direction of the arrow **62** becomes greater than the force acting upon the clamp segment **31** through the agency of the angle lever **61**, then the clamp segment **31** is moved in the direction of rotation denoted by arrow **62**, in a manner as has already been previously described.

As previously mentioned, to achieve the desired wire tension it is important that the diameter of the winding device **24**, specifically the diameter formed by the operative clamping portions of the clamp segments **31** be smaller than the pitch diameter of the sprocket wheel **14**. In the embodiments of FIGURES 4 and 5, in order to achieve a definite diameter of the winding device **24**, impact plates **60** are provided, and against which the wire **30** rests at the periphery of the winding device **24**. The impact plates **60** are located at the stop members **34** at the locations where the wire **30** passes through said stop members (FIGURE 3) and at the clamp jaws **35**. By underlaying the impact plates **60** with supporting disks **63**, advantageously in the form of plate-like inserts such as best shown in FIGURE 4 and also FIGURE 4*a*, the impact plates **60** can be radially displaced, whereby the diameter of the winding device **24**, and therewith, also the predetermined wire tension, can be varied within specific limits.

As previously explained, the opening and closing of the clamp segments **31** automatically results as a function of the rotational movement of the clamping segments **31** and by virtue of the up and down riding of the cam followers or roller members **38**, arranged on the respective lower clamp jaws **36**, upon the ascending and descending cam surfaces **39** and **39***a*, respectively, of the stationary control cam or disk **40**. As FIGURE 3 clearly shows, the wire **30** is tangentially brought at contact point A onto the winding device **24** in its direction of rotation. It will be recognized that the contact point A at the imaginary peripheral circle formed by the rotating clamp jaws **35**, **36** or by the wire impact plates **60**, in the direction of rotation, lies behind the descending cam surface **39***a* of the control disc **40**, so that each respective clamping segment **31** which rotatably moves past contact point A grasps the wire **30** between its open clamp jaws **35**, **36**, and upon passing the descending surface **39***a* clampingly engages the wire. In this mannner, there results a gradual increase in the tension of the length of wire which rests against the

periphery of the winding device **24** in that, namely, each wire engaging clamp segment **31** after the contact point A gradually applies an increased tension to the wire **30**, and by means of which the total desired tension is gradually applied to the wire by the still operating clamp segments.

Should the wire tension increase then the clamp segments **31** move in the direction of rotation against the force of their associated spring members **33**, as has already been clearly discussed hereinabove. The clamping jaws **35**, **36** of the clamping segments **31** now remain in closed position until they approximately arrive at the point B, which is the contact point of the tangent of the wire with respect to the winding device **24** as such wire is tangentially guided from the winding device **24** onto the outer wall **1***b* of the concrete container. Shortly before reaching the contact point B the rollers **38** ride onto the ascending inclined surface **39** of the control cam **40**, whereby the wire **30** is released and the corresponding clamp segment is pressed back into its starting position by the spring member **33**.

It should thus be appreciated that the tension in the wire **30** is periodically increased in a gradual manner as such wire moves between the contact point A, adjacent which such wire is initially clamped by a clamping segment **31**, until it reaches contact point B when it is released by the clamping segment **31** for winding onto the container **1**. Thus, approximately the length of wire located between the contact points A and B has tension progressively applied to it, as the wire moves between said contact points A and B. In order to ensure for a positive engagement of the wire **30** by the clamping jaws **35**, **36**, said clamping jaws may preferably be provided with hard, slightly roughened, plate members **65** or other suitable frictional engaging means.

In the described embodiments of FIGURES 1–5 spring members **33**, **33'** were employed with each clamp segment **31**. In such an arrangement, it is advantageous to use springs possessing a very flat spring characteristic so that the force in the wire and in each wire segment can be maintained substantially within desired limits. If, however, it is desired to maintain the force in the wire and each wire segment at an exact predetermined value, then provision must be made to prevent the slight load increases beyond said value inherent in the use of springs. Such a possible arrangement is disclosed in FIGURE 6.

In the embodiment of FIGURE 6 each of the springs **33** or **33'** are replaced by a cylinder **100** and piston **101** arrangement. The cylinder is supported in appropriate manner on a stop member **34'**. The piston member **101** is adapted to reciprocate in the cylinder **100**. The piston rod **104** of the piston **101** is operably connected to an associated clamp segment **31'**. A pump P feeds a suitable medium, such as oil for example, to the cylinder **100** via a conduit **105** and pressure relief valve **106**. The pressure of oil initially supplied to the cylinder **100** is so selected that a predetermined pressure within the cylinder **100** corresponding to the setting of pressure valve **106** is reached. When the piston **101** is displaced due to the loading of the wire engaged by clamp **31'**, then the oil in the cylinder **100** will permit further piston displacement only with a corresponding opening of the preset pressure relief valve **106**, to allow for escape of oil from the cylinder **100**. In this manner, the increase in tension of the wire from one clamp segment to the next cannot exceed a value corresponding to the value at which the pressure relief valve **106** is opened by the oil pressure within cylinder **100**. As such, it is possible to ensure that the wire tension will not exceed a maximum permissible value. Naturally, other wire-tension overload arrangements are conceivable and numerous modifications of the illustrated cylinder and piston arrangement are of course possible and will be apparent to those skilled in the art.

Having thus described the present invention, what is desired to be secured by United States Letters Patent is:

1. Machine for winding a wire about a container, comprising a supply source for said wire, winding means for winding said wire from said supply source about said container, drive means cooperating with said winding means including an endless transport member adapted to extend about said container and a drive member engageable with said endless transport member to displace said winding means about said container, said winding means including a plurality of independently operable clamping means for engaging said wire at spaced locations, control means operable with said clamping means including means for periodically opening and means for periodically closing each of said clamping means as said wire passes said winding means for winding onto said container.

2. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container, comprising a carriage, drive means for revolving said carriage about said container, a supply source for said wire, winding means for winding said wire from said supply source about said container, said drive means including an endless transport member adapted to extend about said container and a drive member engageable with said endless transport member to displace said winding means about said container, said winding means including a plurality of independently operable clamping means for engaging said wire at spaced locations, control means operable with said clamping means including means for periodically opening and means for periodically closing each of said clamping means as said wire passes said winding means for winding onto said container.

3. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container, comprising a carriage, drive means for revolving said carriage about said container, a supply source for said wire, winding means for winding said wire from said supply source about said container, said drive means including an endless transport member adapted to extend about said container and a drive member engageable with said endless transport member to displace said winding means about said container, said winding means and said drive member being positively connected with respect to one another, said winding means including a plurality of independently operable clamping means for engaging said wire at spaced locations, control means operable with each of said clamping means, said control means including means for periodically opening and means for periodically closing said clamping means as said wire passes said winding means for winding onto said container.

4. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim **3**; wherein each of said clamping means includes a pair of clamp jaws, means mounting at least one of the jaws of a pair for pivotal movement into an open position, said means for opening said clamping means including a cam follower operatively connected with each pivotal clamp jaw and cooperating with said control means to pivot said pivotal clamp jaw into its open position.

5. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim **4**; wherein said control means includes a stationary control cam having an ascending inclined cam surface providing said means for opening said clamping means and a descending inclined cam surface providing a part of said means for closing said clamping means.

6. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim **5**; wherein said closing means further include spring means cooperating with each of said clamping means to normally maintain the latter in closed position.

7. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping

a container according to claim 4; including means mounting each of said clamping means for displacement in the direction of travel of said wire from said supply source towards said container.

8. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 7; wherein resilient means cooperate with each of said clamping means.

9. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 8; including a stop member arranged between two adjacent clamping means, said resilient means being a spring member having one end attached to said stop member and the other end to a confronting clamping means.

10. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 4; wherein said clamping means are angularly arranged in a circle in spaced relation from one another and are provided with effective clamping portions which define an imaginary circle of revolution.

11. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 10; wherein each effective clamping portion of said clamping means is provided with wire impact plate means.

12. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 11; wherein the diameter of said imaginary circle of revolution is smaller than the effective diameter of said drive member, the ratio of the diameter of said drive member to that of said imaginary circle of revolution being so selected as to ensure for a given period of time a predetermined difference between the travel of said drive member on said endless transport member and around said container and the length of wire as measured in its untensioned state wound about said container as said winding means travels about said container, so that said wire will be applied to said container under predetermined tension.

13. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 12; including exchangeable support means underlying said impact plate means, to vary the diameter of said imaginary circle of revolution and therewith said predetermined tension.

14. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 3; including height-adjusting means connected with said winding means to control the spacing between the wound coils of wire.

15. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 3; wherein said winding means includes means operatively connected with each clamping means for limiting the wire tension from exceeding a desired maximum value.

16. Machine for winding a wire and like tie means about a relatively rigid object, particularly for wrapping a container according to claim 15; wherein said wire tension limiting means includes a cylinder and piston arrangement operably associated with each clamping means.

17. Apparatus for wrapping a wire about a container, comprising a wheeled chassis, drive means for rotating said wheeled chassis about said container, a supply source for said wire, winding means for winding said wire from said supply source about said container, said drive means including an endless transport member adapted to extend about said container and a drive member engageable with said endless transport member to displace said winding means about said container, said winding means including a plurality of independently operable clamping means having effective clamping portions for engaging said wire at spaced locations, said effective clamping portions during rotation thereof defining an imaginary circle of revolution possessing a diameter which is smaller than the effective diameter of said drive member, the ratio of the diameter of said drive member to that of said imaginary circle of revolution being so chosen as to ensure for a given period of time a predetermined difference between the travel of said drive member on said endless transport member and around said container and the length of wire as measured in its untensioned state wound about said container as said winding means travels about said container, whereby said wire will be applied to said container under predetermined tension, control means operable with said clamping means, said control means including means for periodically opening and means for periodically closing said clamping means as said wire passes said winding means for winding onto said container, and means operatively connected to said winding means for height adjustment of the latter relative to said container to control the spacing between the coils of said wire wound about said container.

18. Apparatus for wrapping a wire about a container according to claim 17; wherein said drive member is a rotatably mounted sprocket wheel, said clamping jaws being displaceably mounted to said sprocket wheel for movement relative thereto in a normal direction of travel of said wire, whenever said predetermined tension is exceeded.

19. A method of winding a wire and similar tie means about a container, comprising the steps of: securing the leading end of a finite length of wire to a container, winding said wire about said container while applying a predetermined tension to said wire, periodically clamping said wire at a plurality of spaced locations as such wire moves past an initial point of clamping, and releasing said thus clamped wire as said wire moves past a point of release of said clamping and prior to winding onto said container, to thereby incrementally increase the tension in the length of wire between said clamp and release points, approximately up to the desired tension with which the wire is to be wound onto said container.

20. A method of winding a wire and the like about a container, comprising the steps of: securing the leading wire end of a supply of wire supported on a winding apparatus to the container to be wound with such wire, displacing said winding apparatus to move about said container in order to continuously draw-off said wire from said wire supply, controlling the length of the displacement path of said winding apparatus about said container relative to the length of wire drawn-off of said cable supply and applied to said container, such that said length of wire applied to said container as measured in its untensioned state is less than the displaced path of said winding apparatus, to thereby apply a predetermined tension to said wire being wound about said container, periodically clamping said wire at a first location as it moves towards said container, and periodically unclamping said wire at a second location forwardly of said first location and in the direction of travel of said wire onto said container, whereby the tension in the length of wire disposed between said first and second locations is gradually increased, to approach said predetermined tension with which said wire is to be wound onto said container.

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