United States Patent [19]

Rees

[11] **3,789,594**

[45] **Feb. 5, 1974**

[54] **WRAPPING APPARATUS**

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[73] Assignee: **United States Steel Corporation,** Pittsburgh, Pa.

[22] Filed: **June 6, 1972**

[21] Appl. No.: **260,157**

[52] **U.S. Cl.** **57/10,** 242/7.22

[51] **Int. Cl.** **B65h 81/06**

[58] **Field of Search** 57/3, 6, 9, 10, 11, 13–15; 242/7.01, 7.02, 7.06, 7.19, 7.21, 7.22, 7.23

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Primary Examiner—John Petrakes

Attorney, Agent, or Firm—Ralph H. Dougherty

[57] **ABSTRACT**

A wrapping apparatus for wrapping a strip material about an elongated member on a suspension type bridge having a guide member mounted above said elongated member is disclosed.

The wrapping apparatus has a torque stay frame depending from the guide member and movable on the guide member. A frame is secured to the torque stay frame and is movable on the elongated member. A flyer is rotatable with respect to the frame and the elongated member. A strip material feeding means is rotatably mounted on the flyer and has the free end of the strip material attached to the elongated member so that rotation of the flyer relative to the elongated member wraps the strip material about the elongated member.

A longitudinal drive means has a drum rotatable on the frame and a rope member is connected to the drum and to the elongated member. Connecting means are between the longitudinal drive means and the flyer so that rotation of the flyer causes rotation of the drum with attendant winding of the rope member on the drum and resultant predetermined linear movement of the wrapping apparatus with respect to the elongated member for each revolution of the flyer with respect to the elongated member.

15 Claims, 11 Drawing Figures

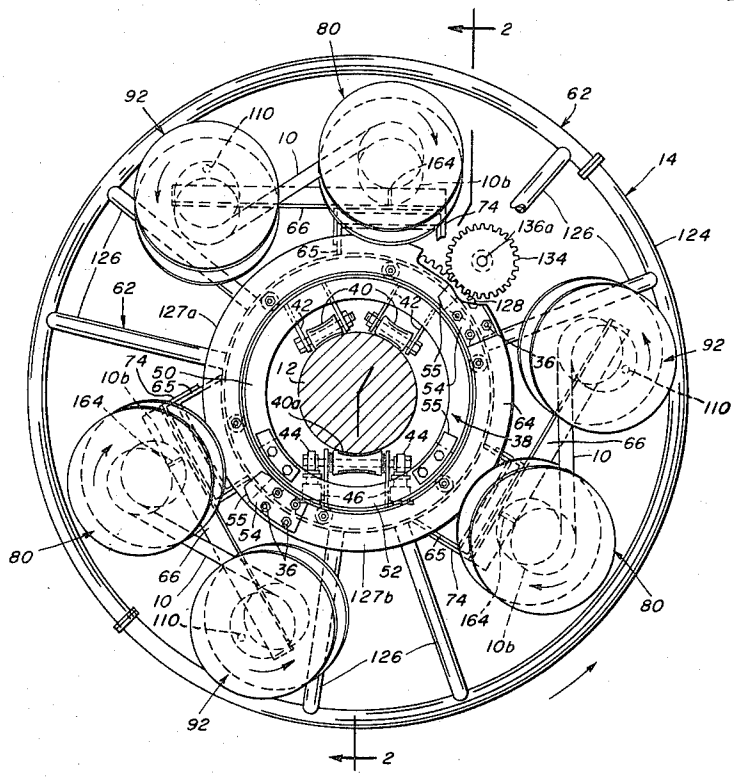


FIG. 1.

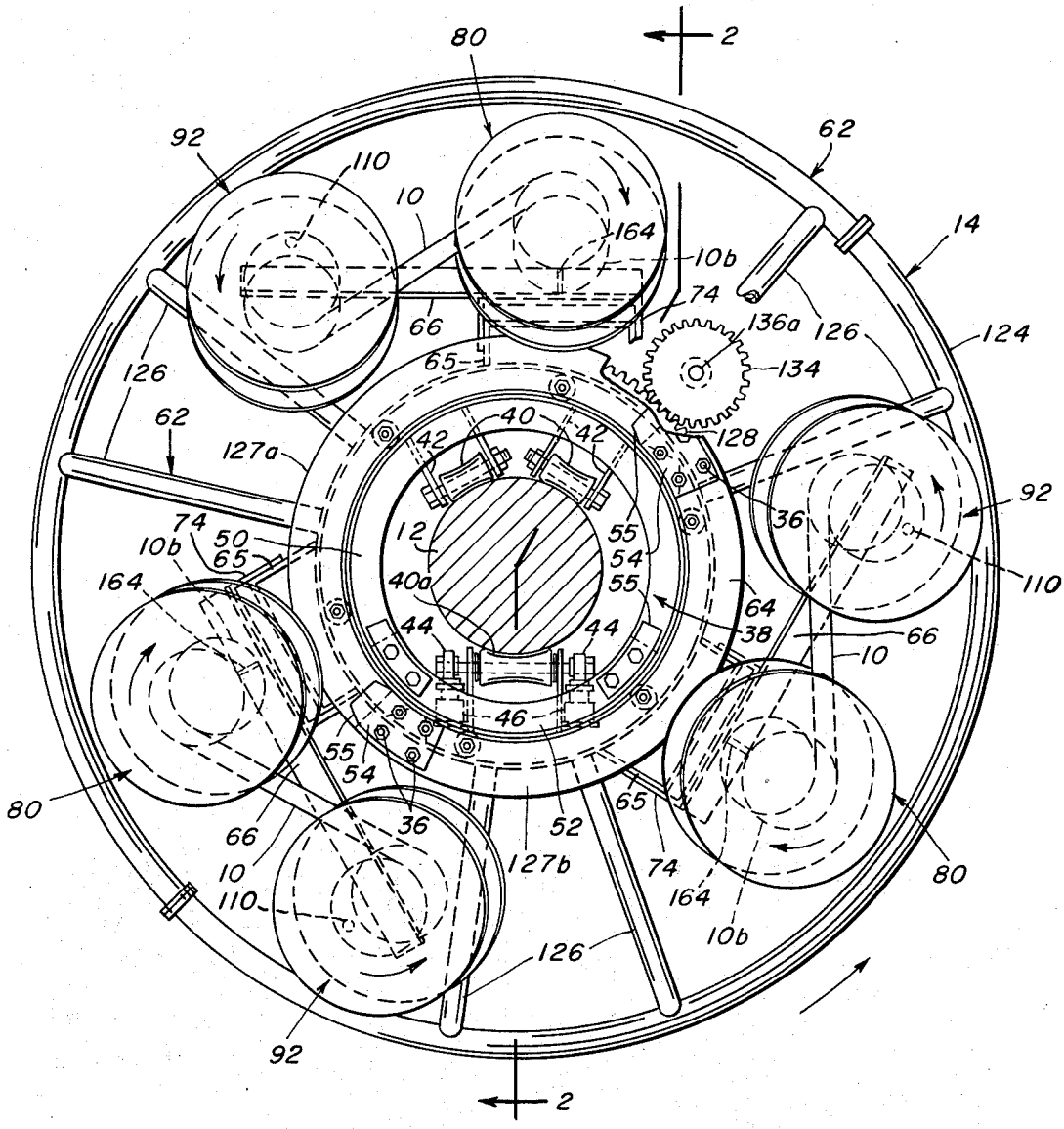

80
2
92
62
110
10
164
10b
14
74
66
136a
126
124
65
134
126
62
40
42
42
128
127a
92
74
50
10b
65
12
55
36
110
164
40a
54
55
64
44
44
38
66
10
46
55
54
80
65
66
36
52
74
10
127b
164
80
110
10b
126
92
2

FIG. 2.

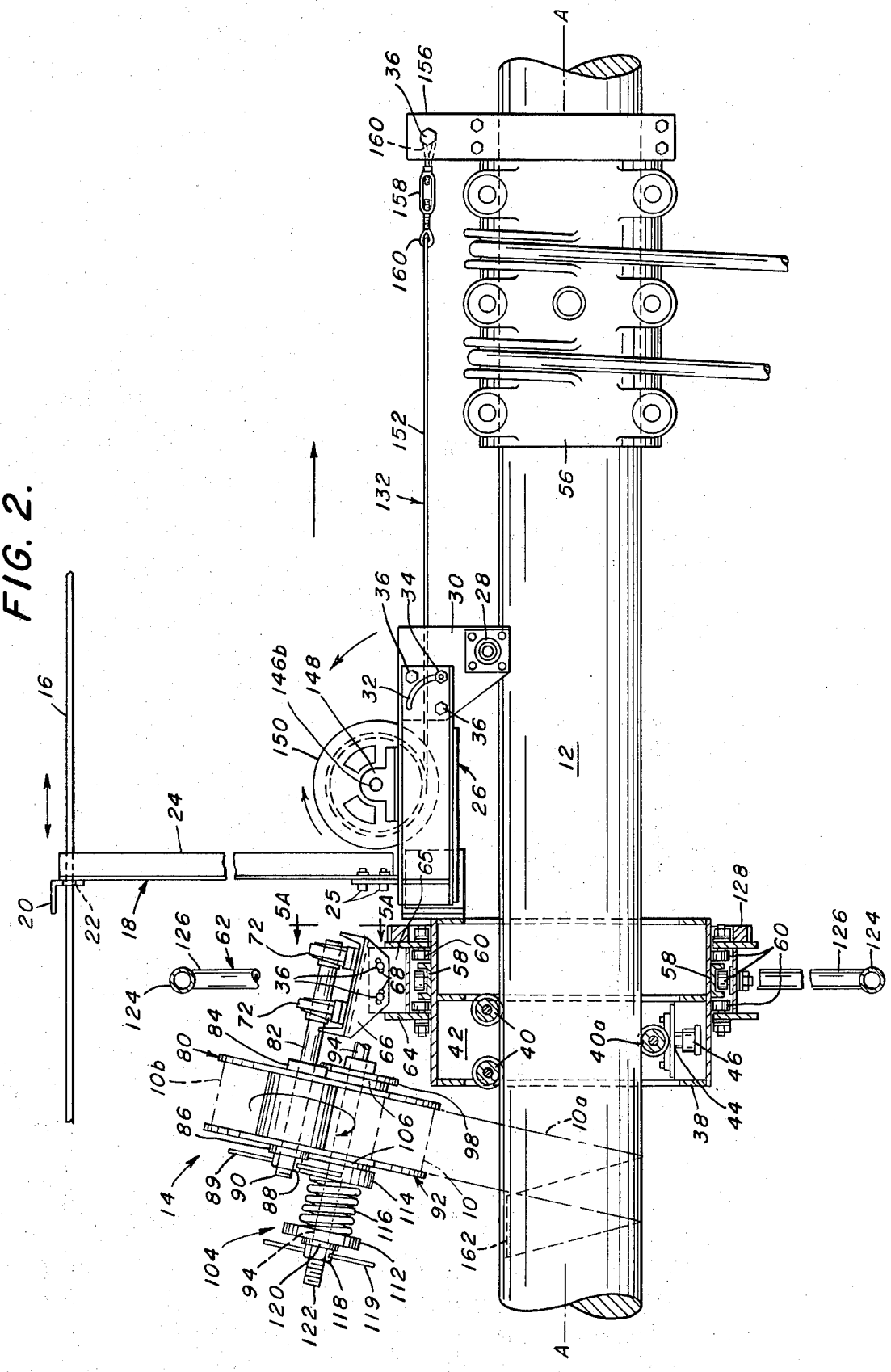

A
36
156
160
158
160
152
132
56
36
34
30
28
146b
148
32
150
36
12
26
16
24
20
22
18
65
25
54
54A
126
62
72
124
36
68
58
60
128
60
126
124
84
72
82
80
94
66
64
42
40
40a
58
46
10b
86
106
98
10a
38
44
14
89
90
88
92
10
116
114
104
94
120
122
118
119
112
162
A

FIG. 3A.

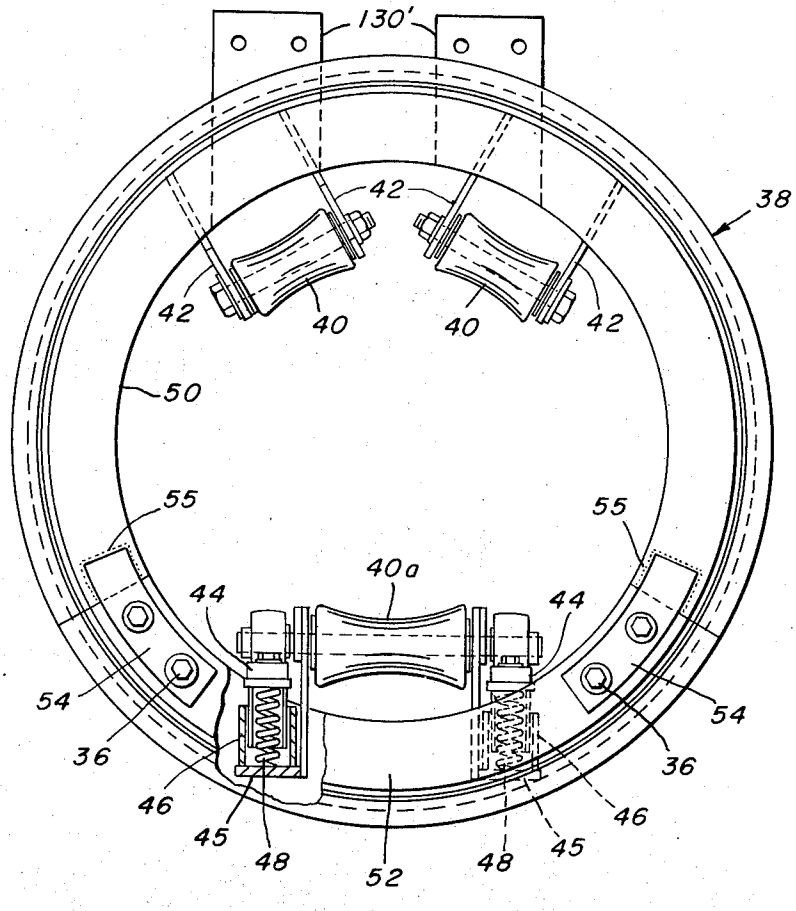

130'
38
42
42
40
40
42
50
55
55
40a
44
44
54
54
36
36
46
46
45
45
48
48
52

FIG. 7.

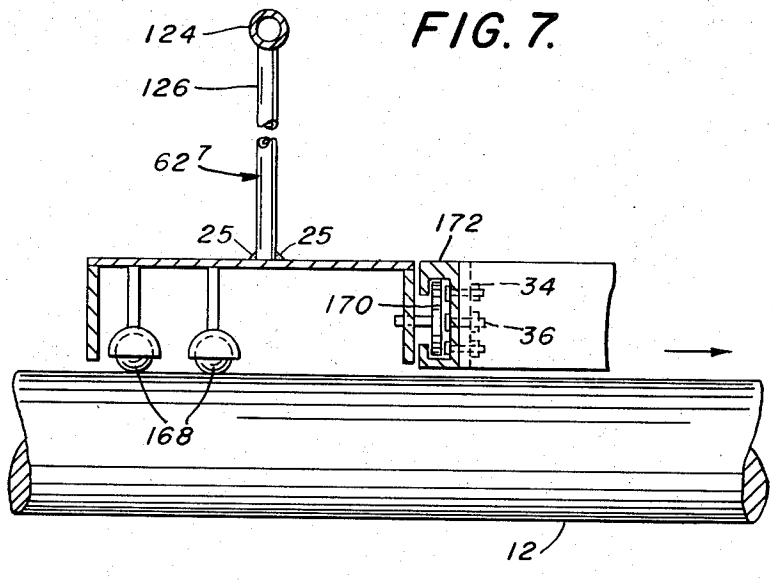

124
126
62
25
25
172
34
170
36
168
12

FIG. 3C.

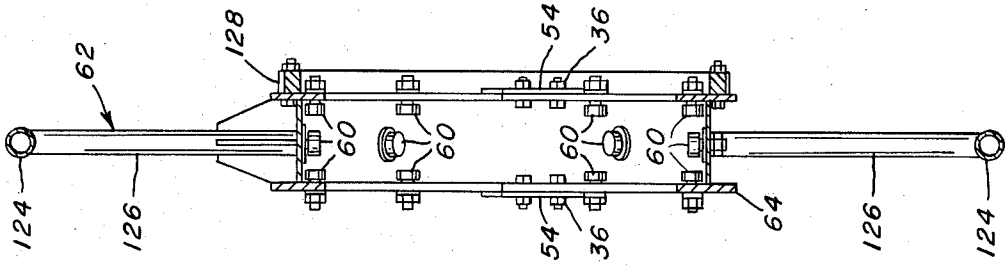

62
128
54
36
60
124
126
64

FIG. 3B.

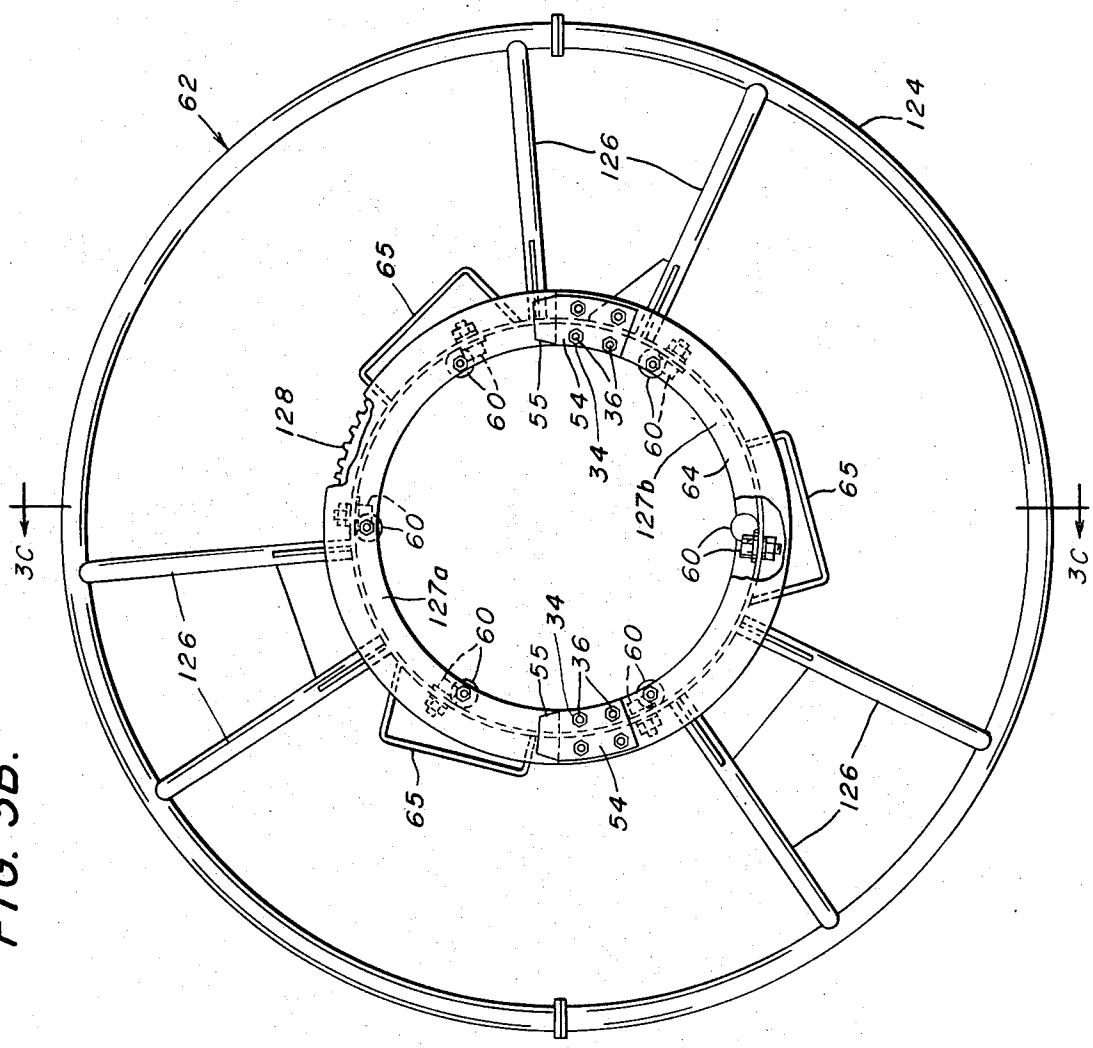

62
124
126
65
128
60
55
54
36
34
127b
64
3C
127a

FIG. 4.

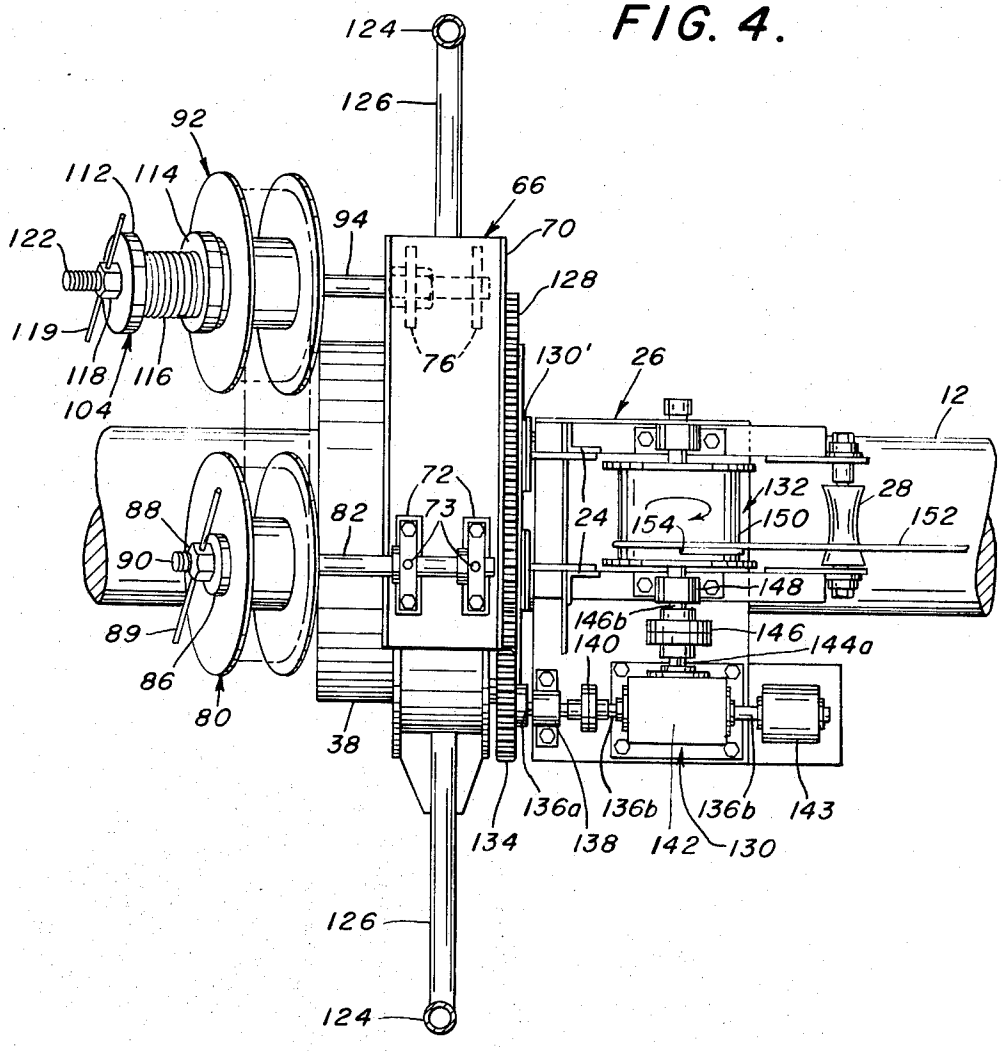

124
126
92
112
114
66
70
94
122
128
119
76
130'
26
118
116
104
12
72
132
28
88
82
73
24
154
150
152
90
148
146b
146
144a
89
140
86
80
38
136a
136b
136b
143
134
138
142
130
126
124

FIG. 6.

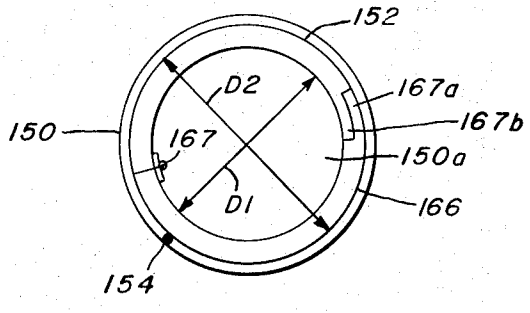

152
D2
167a
167b
150
167
150a
D1
166
154

FIG. 5A.

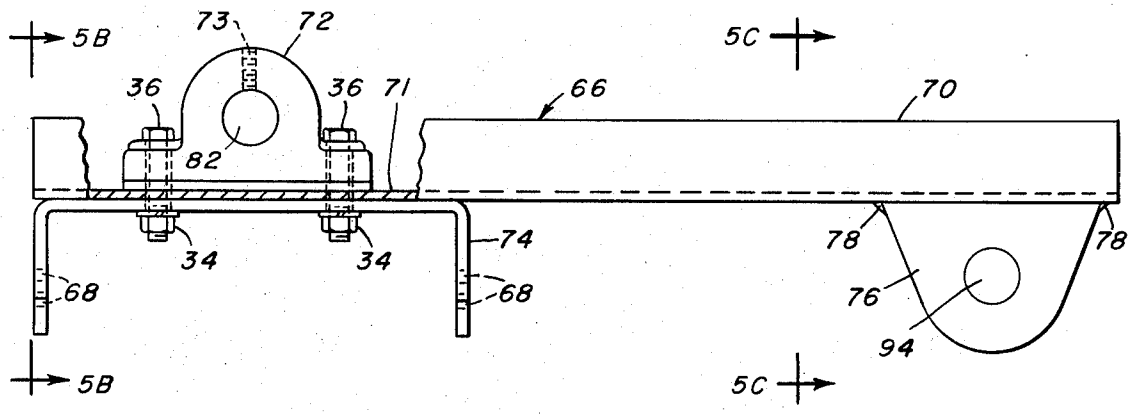


FIG. 5B.

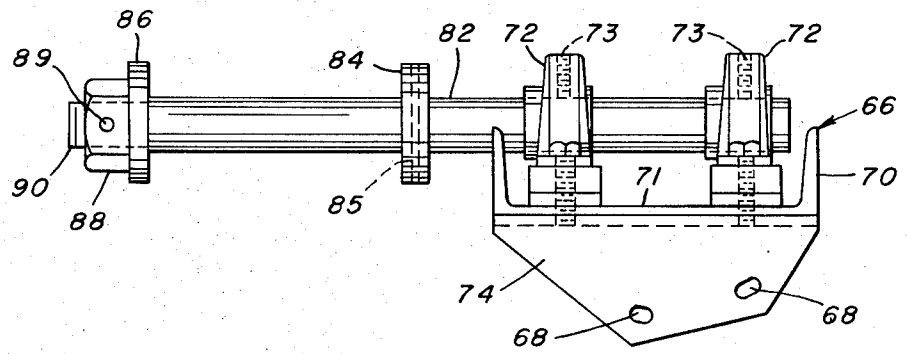
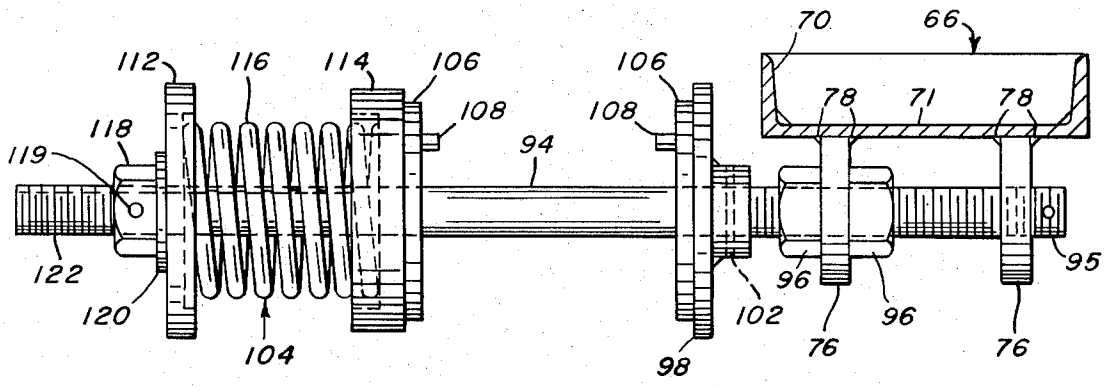


FIG. 5C.



WRAPPING APPARATUS

BACKGROUND OF THE INVENTION

Heretofore, elongated members, such as the main cables of a suspension type bridge have been wrapped with wire by wrapping apparatus of the type shown in the following prior art:

U.S. Pat. No.	Inventor	Issued
1,250,705	Van Amburgh	12/18/17
1,725,540	Robinson	8/20/29
1,899,850	Burton et al.	2/28/33
2,271,528	Pfohl et al.	2/3/42
2,657,866	Lungstrom	11/3/53
2,770,284	Myrick	11/13/56
2,923,486	Betzel, Sr.	2/2/60
3,259,370	Neale, Sr.	7/5/66
3,392,933	Singh	7/16/68
3,404,526	Thomas	10/8/68

The patent to Burton et al U.S. Pat. No. 1,899,850 shows a pipe wrapping machine that moves axially along the pipe by means of manual driven gears as it wraps the pipe.

The Singh U.S. Pat. No. 3,392,933 discloses a tension means for a cable wrapping machine.

The Neale U.S. Pat. No. 3,259,370 shows a cable lashing machine.

OBJECTS OF THE INVENTION

It is the general object of this invention to avoid and overcome the foregoing and other difficulties of and objections to prior art practices by the provision of an improved wrapping apparatus for wrapping strip material on an elongated member (such as a cable on a suspension type bridge), which wrapping apparatus:

1. is moved longitudinally with respect to the elongated member in response to the rotation of the flyer, which flyer carries the strip material at a predetermined linear rate of speed relative to the elongated member for each revolution of the flyer thereby wrapping the proper amount of strip material on the elongated member;

2. provides positionable mounting of the strip material feeding bobbin and protective strip collecting bobbin on the flyer with respect to the elongated member;

3. regulates the tension on the strip material by means of a positionable brake;

4. positions the strip material feeding bobbin and protective strip collecting bobbin at a predetermined angle with respect to the longitudinal axis of the elongated member to provide a desired angle of incidence of the strip material with respect to the elongated member;

5. provides spacer means on the hub of the drum of the longitudinal drive means of the wrapping apparatus to vary the diameter of the drum of such longitudinal drive means thereby controlling the linear speed of the wrapping apparatus; and

6. wraps a double thickness of strip material about the elongated member.

BRIEF SUMMARY OF THE INVENTION

The aforesaid objects of this invention, and other objects which will become apparent as the description proceeds, are achieved by providing a wrapping apparatus for wrapping a strip material about an elongated member on a suspension type bridge having a guide member mounted above the elongated member.

The wrapping apparatus has a torque stay frame depending from the guide member and movable on the guide member. A frame is secured to the torque stay frame and is movable on the elongated member. A flyer is rotatable with respect to the frame and the elongated member. A strip material feeding means is rotatably mounted on the flyer and has the free end of the strip material attached to the elongated member so that rotation of the flyer relative to the elongated member wraps the strip material about the elongated member.

A longitudinal drive means has a drum rotatable on the frame and a rope member connected to the drum and to the elongated member. Connecting means are between the longitudinal drive means and the flyer so that rotation of the flyer causes rotation of the drum with attendant winding of the rope member on the drum and resultant predetermined linear movement of the wrapping apparatus with respect to the elongated member for each revolution of the flyer with respect to the elongated member.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

For a better understanding of this invention, reference should be had to the accompanying drawings, wherein like numerals of reference indicate similar parts throughout the several views and wherein:

FIG. 1 is an end elevational view showing an elongated member, such as a cable, about which the strip material is to be wrapped, the mounting ring on the frame and its guide rollers engaging the cable, the flyer which is rotatable on the mounting ring of the frame of the wrapping apparatus, a girth gear on the flyer and three sets of bobbins, each including a strip material feeding bobbin and a protective strip collecting bobbin with the strip material extending from the protective strip collecting bobbin to the cable being omitted for clarity;

FIG. 2 is a vertical sectional view taken along the line 2—2 of FIG. 1 in the direction of the arrows and showing for the sake of clarity, only one set of the bobbins (i.e., a strip material feeding bobbin and protective strip collecting bobbin), the drum of the longitudinal drive means and its rope member secured to a rope clamp disposed about the cable adjacent a cable band and omitting, also for the sake of clarity, the connecting means including the intermediate mechanism between the drum and the girth gear on the flyer;

FIG. 3A is an end elevational view of the mounting ring of the frame showing the slit half construction of the mounting ring, the two sets of fixed guide rollers and the spring biased guide roller which engage the cable and move longitudinally on such cable;

FIG. 3B is an end elevational view of the flyer showing its split half construction, the spokes connecting the inner ring of the flyer and its outer ring and the mounting brackets for the three sets of strip material feeding bobbins and protective strip collecting bobbins;

FIG. 3C is a vertical sectional view taken along the line 3C—3C of FIG. 3B taken in the direction of the arrows;

FIG. 4 is a fragmentary plan view of the longitudinal drive means and the connection means between the longitudinal drive means and the flyer showing the girth gear of the flyer, the engaging pinion on the frame of

the wrapping apparatus, the gear box and the connecting shafts for the drum;

FIG. 5A is a side elevational view (taken along the line 5A—5A of FIG. 2 in the direction of the arrows) of one of the positionable mounting brackets for the shafts of each strip material feeding bobbin and the protective strip collecting bobbin;

FIG. 5B is a view similar to one taken along the line 5B—5B of FIG. 5A in the direction of the arrows and showing the shaft and mounting means for the protective strip collecting bobbin but omitting for clarity the protective strip collecting bobbin;

FIG. 5C is a view similar to one taken along the line 5C—5C of FIG. 5A in the direction of the arrows and showing the bobbin mounting bracket, the shaft for the strip material feeding bobbin, the mounting means for the strip material feeding bobbin and the tensioning means associated with the strip material feeding bobbin for applying a predetermined tension to the strip material feeding bobbin and hence the strip material, but omitting for clarity the strip material feeding bobbin;

FIG. 6 is a side elevational view of the hub of the drum of the longitudinal drive means and a spacer for increasing the diameter of such hub held on the hub by the rope; and

FIG. 7 is a fragmentary side elevational view of an alternative embodiment of the wrapping apparatus omitting the mounting ring and showing the flyer engaged with the frame of the wrapping apparatus by means of rollers and roller retainers and showing the flyer having ball bearing type rollers depending therefrom and engageable with the cable for both rotary and longitudinal movement with respect to the cable.

Although the principles of this invention are broadly applicable to the wrapping of strip material about an elongated member, this invention is particularly adapted for use in conjunction with the wrapping of a plastic strip material about a main cable of a suspension type bridge, and hence it has been so illustrated and will be so described.

DETAILED DESCRIPTION

With specific reference to the form of this invention illustrated in the drawings and referring particularly to FIGS. **1** and **2**, a wrapping apparatus for wrapping a strip material **10** (having a neoprene strip **10***a*, FIG. **2**, or the like, covered by a protective paper strip **10***b*, FIG. **2**, or the like) about an elongated member, such as a main cable **12** (FIGS. **1,2**) on a suspension type bridge (not shown) or the like, is indicated by the reference numeral **14**. As shown in FIGS. **1** and **2**, the bridge (not shown) has guide members, such as the hand ropes **16** (FIG. **2**) or the like, mounted above the cable **12**.

WRAPPING APPARATUS 14

This wrapping apparatus **14** has a torque-stay frame **18** (FIG. **2**) depending from the hand ropes **16**, movable on the hand ropes **16** and employed for stabilizing the wrapping apparatus **14** as hereinafter explained.

TORQUE STAY FRAME 18

As shown particularly in FIG. **2**, this torque stay frame **18** has a horizontally disposed angle **20** (FIG. **2**) provided with clearance slots **22** (FIG. **2**) adapted to receive the hand ropes **16** and to permit the torque stay frame **18** to move along such hand ropes **16** in stabilized motion in the direction of the arrows in FIG. **2**. Adjacent each end of the horizontal angle **20**, a vertical plate member, bracket or the like **24** (FIGS. **2,4**) depends from the horizontal angle **20** and is secured at its lower portions as by welds, nuts or bolts or the like **25** (FIG. **2**) to a frame **26** (FIGS. **2,4**) of the wrapping apparatus **14**.

FRAME 26

As shown particularly in FIGS. **2** and **4**, the frame **26** of the wrapping apparatus **14** is movable on the cable **12** by means of wheels **28** (FIG. **2**) journalled in brackets **30** affixed adjustably to the frame **26** as by slots **32**, nuts **34** and bolts **36**. By loosening the nuts **34** and bolts **36**, the brackets **30** and wheels **28** may be swung counterclockwise in the direction of the arrow (FIG. **2**) to permit their passage over a cable band **56** (FIG. **2**). As shown in FIGS. **1** and **2**, a mounting ring **38** of the frame **26** (FIGS. **2,3A**) projects from the left hand end portions of the frame **26**, is connected to the frame by brackets **130'** (FIGS. **3A,4**) and is provided with a plurality of fixed rollers **40** and a movable spring biased roller **40***a* (FIGS. **1,2,3A**). Each roller **40** depends by means of a bracket **42** (FIGS. **1,2,3A**) from the inner surface of the mounting ring **38** and engages the cable **12** to permit longitudinal movement of the frame **26** and the mounting ring **38** on the cable **12**.

As shown particularly in FIGS. **1** and **3A**, the movable roller **40***a* is mounted on portions **44** (FIGS. **1,3A**) of spring retainers **46** (FIGS. **1,2,3A**) having other cooperating telescoping portions **45**. The spring retainers **46** contain springs **48** (FIG. **3A**) for biasing such movable roller **40***a* into engagement with the cable **12**.

As shown particularly in FIGS. **1** and **3A**, the mounting ring **38** is of generally split construction and has a first half portion **50** (FIGS. **1,3A**) and a second half portion **52** (FIGS. **1**, **3A**) the half portions **50** and **52** being secured together by plates **54**, welds **55** and bolts **36** and nuts **34** (FIGS. **1,3A**). This split construction of the mounting ring **38** permits the facile disassembly of the wrapping apparatus **14** when the wrapping apparatus **14** engages a cable band **56** (FIG. **2**) on the cable **12** to permit the removal of the wrapping apparatus **14** from about the cable **12** and its reassembly on the other side of the cable band **56**. Also as shown in FIG. **2**, the mounting ring **38** is provided with a roller track or ring **58**, which ring **58** is adapted to receive a plurality of rollers **60** (FIGS. **2,3B,3C**) for the rotatable mounting of a flyer **62** (FIGS. **1,2,3B** and **3C**) on such mounting ring **38**.

FLYER 62

This flyer **62** (FIGS. **1,2,3B,3C**) is rotatable on the rollers **60** with respect to the mounting ring **38** of the frame **26** of the wrapping apparatus **14** and also the cable **12**. It will be understood that when such flyer **62** is rotated on the rollers **60** with respect to the mounting ring **38**, the torque stay frame **18** maintains the frame **26** of the wrapping apparatus **14** in a stabilized position. In order to mount the flyer **62** in rotatable engagement with the mounting ring **38**, a roller mounting ring **64** (FIGS. **1,2,3B,3C**) containing the rollers **60** against the mounting ring **38**, is disposed about the mounting ring **38**. Such roller mounting ring **64** serves as a mounting means for three sets of bobbins, each set having a strip material feeding bobbin **92** and a protective strip collecting bobbin **80** (FIGS. **1,2,4**).

The further description of the flyer **62** will be interrupted for the sake of clarity so that the associated means for mounting the strip material feeding bobbin **92** and the protective strip collecting bobbin **80** may be discussed.

BOBBIN MOUNTING MEANS

A bobbin mounting bracket **66** (FIGS. **1,2,3B**) for each set of bobbins **92,80** is adjustably mounted on a bracket **65** (FIGS. **1,2,3B**) projecting from a roller mounting ring **64** by means of slots **68** (FIGS. **2,5A,5B**) in both the bracket **65** and the mounting flanges **74** (FIGS. **5A,5B**) of the bobbin mounting bracket **66** and bolts and nuts or the like.

As shown particularly in FIG. **5B**, each bobbin mounting bracket **66** has a generally U-shaped body portion **70** and on its left hand end, as viewed in FIG. **5A**, such body portion **70** (FIGS. **5A–5C**) has a pair of pillow blocks **72** (FIGS. **2,5A,5B**) secured to the top of the bottom plate portion **71** (FIGS. **5A–5C**) of the bracket **66,** as by bolts **36** and nuts **34** (FIG. **5A**) or the like. As shown in FIG. **5A**, such bolts **36** and nuts **34** also secure the generally U-shaped mounting flanges **74** of the bracket **66** to the bottom of the bottom plate portion **71** of the body portion **70.** Referring now to the right hand portion of FIG. **5A**, a pair of brackets **76** (FIGS. **5A,5C**) depend from the bottom plate portion **71** of the bobbin mounting bracket **66** and are secured thereto, as by welds **78** (FIGS. **5A,5C**) or the like.

Referring now to FIG. **5B**, the means utilized to mount a protective strip material collecting means, such as the protective strip material collecting bobbin **80** (FIGS. **1,2,4**) comprises a shaft **82** (FIGS. **2,4,5A,5B**) which extends through the pillow blocks **72,** on the bobbin mounting bracket **66,** and is secured therein by screws **73** (FIGS. **5A,5B**) or the like. The bottom shaft **82** (FIGS. **2,4**) carries on its mid portion, as viewed in FIG. **5B**, a fixed bobbin retainer **84** (FIGS. **2,5B**), fixed to the shaft **82** as by a pin **85** (FIG. **5B**) or the like and a removable bobbin retainer **86** (FIGS. **2,5B**) secured to the left hand end of the shaft **82** (FIG. **5B**) by means of a nut **88** (having a handle **89,** FIGS. **2,5B**). The nut is threaded onto a threaded end portion **90** (FIGS. **2,5B**) of shaft **82** thereby securing each protective strip material collecting bobbin **80** between the fixed retainer **84** and the removable bobbin retainer **86.**

The means utilized to mount a strip material feeding bobbin **92** (FIGS. **1,2,4**) on a bobbin mounting bracket **66** has a shaft **94** (FIGS. **1,2,4,5C**) having its threaded right hand end **94** (FIG. **5C**) secured by means of nuts **96** (FIG. **5C**) in the mounting brackets **76** of the bobbin mounting bracket **66** and a fixed bobbin retainer **98** (FIG. **2,5C**) secured in position by means of a pin **102** or the like. For the purpose of applying a predetermined tension to the strip material bobbin **92** and hence the strip material **10,** a strip tension means **104** (FIGS. **2,4,5C**) is provided.

STRIP TENSION MEANS 104

This strip tension means **104** has friction brakes, suitably brass discs **106** (FIGS. **2,5C**) or the like, disposed on the shaft **94** and provided with keys **108** (FIG. **5C**), which keys **108** are engageable with slots **110** (FIG. **1**) in the strip material feeding bobbin **92.** In addition, spring retainers **112,114** (FIGS. **2,4,5C**) are disposed on the shaft **94** for containing therebetween a spring **116** (FIGS. **2,4,5C**) disposed about the shaft **94.** A nut **118** (FIGS. **2,4,5C**) has a handle **119** and washer **120** (FIGS. **2,4,5C**) on the threaded left hand end **122,** as viewed in FIGS. **2,4,5C**, of the shaft **94** and the spring **116** hold the disc brakes **106** in engagement with the associated strip material feeding bobbin **92** with the predetermined amount of tension on such strip material feeding bobbin **92** and hence on the strip material **10.** It will be understood that the brass discs **106** keyed to the bobbin **92** are movable with respect to the fixed spring retainer **114** and the fixed bobbin retainer **98** (FIGS. **2,4,5C**).

Having completed the description of the bobbin mounting means and the three sets of bobbins **92** and **80,** the description of the flyer **62** shown in FIGS. **1,2,3B,3C,4** will be completed.

FLYER 62

This flyer **62** (FIGS. **1,2,3B,3C,4**) has an outer ring **124** (FIGS. **1,3B,3C,2,4**) which outer ring **124** is connected by means of spokes **126** (FIGS. **1,2,3B,3C,4**) to the roller mounting bracket **64.** As shown in FIGS. **1** and **3B**, the flyer **62** has a first half section **127***a* and a second half section **127***b*, removably connected to the first half section **127***a* by means of the welds **55,** plates **54** and bolts **36** (FIGS. **1,3B**) and nuts **34** (FIG. **3B**). As shown in FIG. **1,** the flyer **62** is movable, for example, by means of manual operation in a counter clockwise direction (as indicated by the arrow in FIG. **1**) on the rollers **60** with respect to the mounting ring **38** of the frame **26** and carries a girth gear **128** (FIGS. **1,2,3B,3C,4**), which girth gear **128** forms a part of a connecting means **130** between a longitudinal drive means **132** and the flyer **62.**

CONNECTING MEANS 130

As shown particularly in FIG. **4,** the girth gear **128** on the flyer **62** engages a pinion **134** (FIGS. **1,4**) on a shaft **136***a* (FIGS. **1,4**) journalled in a bearing **138** (FIG. **4**) mounted on the frame **26** of the wrapping apparatus **14.** This shaft **136***a* (FIGS. **1,4**) is connected through a coupling **140** (FIG. **4**) to a shaft **136***b* extending through a gear box **142** (FIG. **4**) to the right hand end (as viewed in FIG. **4**) of the gear box **142,** where a suitable motor, such as an electrical motor, air motor or the like **143** (FIG. **4**) may be attached to the shaft **136***b* for automatic operation of the wrapping apparatus **14** as desired.

A shaft **144***a* (FIG. **4**) extends (at right angles to the shaft **136***b*) from the gear box **142** and is connected through a coupling **146** to a shaft **146***b*. The shaft **146***b* is journalled in a bearing **148** (FIGS. **2,4**) mounted on the frame **26** of the wrapping apparatus **14** and drives a drum **150** (FIGS. **2,4**) journalled in such bearings **148** on the frame **26** of the wrapping apparatus **14.** This drum **150** (FIGS. **2,4**) forms a part of the longitudinal drive means **132.**

LONGITUDINAL DRIVE MEANS 132

The longitudinal drive means **132** (FIGS. **2,4**) has a rope member **152** (FIGS. **2,4**) attached at **154** (FIG. **4**) to the drum **150** and extending away from the drum **150** to a rope clamp **156** (FIG. **2**). This rope clamp **156** is secured about the cable **12** adjacent the cable band **56** and the free end of the rope **152** is secured to the rope clamp **156** by means of a turnbuckle **158** (FIG. **2**), eyes **160,** and bolts **36** and nuts (not shown).

OPERATION OF THE APPARATUS 14

As shown particularly in FIGS. 1 and 2, the strip material 10 comprises the neoprene or the like strip 10*a* (FIG. 2) covered by the protective paper or the like strip 10*b* (FIG. 2). The free end of each of the three neoprene strips 10*a* is attached to the elongated member at starting points 162 (FIG. 2) on the cable 12 so that rotation of the flyer 62 relative to the cable 12 wraps the neoprene strips 10*a* about the cable 12. Meanwhile, the protective paper strip 10*b* has been passed over the protective strip collecting bobbin 80 (FIG. 1) and the free end of the protective strip 10*b* has been secured in a securing means, such as a slot 164 (FIG. 1) or the like, in the hub of the protective strip collecting bobbin 80 so that such protective strip collecting bobbin 80 is rotatable by the movement of the plastic material 10a to drive the protective strip collecting bobbin 80 in a clockwise direction shown by the arrows in FIG. 1, thereby removing the protective strip 10*b* from the neoprene strip 10*a* before such neoprene strip 10*a* engages the cable 12 and thus storing the removed protective strip 10*b* on the protective strip collecting bobbin 80, as shown in FIG. 2.

It will be appreciated that as the flyer 62 is rotated either manually by the operator in the counter clockwise direction indicated by the arrow in FIG. 1 or by the motor 143 (FIG. 4), the flyer 62 causes rotation of the drum 150 in the direction of the arrows shown in FIGS. 2 and 4 with attendant winding of the rope 152 on the drum 150 and the resultant predetermined linear movement of the frame 26 and the wrapping apparatus 14 in the direction of the large arrow in FIG. 2 with respect to the cable 12 for each revolution of the flyer 62 with respect to such cable 12.

ALTERNATIVE EMBODIMENTS

It will be understood by those skilled in the art that alternatively the drum 150 shown in FIG. 6 may be provided with a spacer 166 hinged at 167 and having its free ends 167*a*,167*b* disposable on the hub 150*a* of the drum 150 in lapped engagement thereby increasing the diameter D1 (FIG. 6) of the drum 150 to D2 and thus increasing the linear velocity of the wrapping apparatus 14 for each revolution of the flyer 62. The rope 152 holds the spacer 166 on the hub 150*a* of the drum 150.

As shown in FIG. 7, the mounting ring 138 may be dispensed with and the rollers 40 and 40*a* replaced by caster type ball bearings 168 mounted on the flyer 62^7. These caster type ball bearings are engageable with the cable 12 and the flyer 62^7 is rotatable on the frame 26 by means of a plurality of rollers 170 projecting either from the frame 26 or the flyer 62^7 (as shown in FIG. 7) into a split construction roller track 172 mounted on the other member of the frame 26 or the flyer 62^7, in this case, the frame 26.

It will be understood from a consideration of FIG. 2 that the strip material feeding bobbin 92 and the protective strip collecting bobbin 80 are positionably mounted with respect to the roller ring mounting bracket 64 by means of the slots 68 and nuts 34 and bolts 36 so that the angle which the longitudinal centerline or shafts 82 and 94 of each bobbin 80 and 92 makes with the axis A—A (FIG. 2) of the cable 12 is set at about 12°–15° so that the angle of incidence of the strip material 10*a* with respect to the cable 12 is in the same range about 12°–15° thereby insuring proper wrapping of the strip material 10a in a double thickness about the cable 12.

SUMMARY OF THE ACHIEVEMENTS OF THE OBJECTS OF THE INVENTION

It will be recognized by those skilled in the art that the objects of this invention have been achieved by providing an improved wrapping apparatus 14 for wrapping a plastic strip material 10*a* about a cable 12 on a suspension type bridge (not shown). This improved wrapping apparatus 14 is moved longitudinally with respect to the cable 12 in response to the rotation of the flyer 62 (which flyer 62 carries the strip material 10) at a predetermined linear rate of speed relative to the cable 12 for each revolution of the flyer 62, thereby wrapping the proper amount of the plastic strip material 10*a* on the cable 12; provides positionable mounting of the strip material feeding bobbin 92 and the protective strip collecting bobbin 80 on the flyer 62; regulates the tension on the strip material 10 by means of adjustable brakes or discs 106 associated with the tensioning means 104; positions the strip material feeding bobbin 92 and the protective strip collecting bobbin 80 at a predetermined angle with respect to the cable 12 to provide a desired angle of incidence between the strip material 10*a* and the cable 12; provides spacer means 166 (FIG. 6) on the hub 150*a* of the drum 150 to increase the diameter of the drum 150 thereby increasing the linear speed of the wrapping apparatus 14; and wraps a double thickness of strip material 10a about the cable 12.

While in accordance with the patent statutes, preferred and alternative embodiments of this invention have been illustrated and described in detail, it is to be particularly understood that the invention is not limited thereto or thereby.

I claim:

1. A wrapping apparatus for wrapping a strip material about an elongated member on a suspension type bridge, said bridge having a guide member mounted above said elongated member, said wrapping apparatus having:

a. a torque stay frame depending from said guide member and movable on said guide member;

b. a frame secured to said torque stay frame and movable on said elongated member;

c. a flyer rotatable with respect to said frame and said elongated member;

d. strip material feeding means rotatably mounted on said flyer and having the free end of said strip material attached to said elongated member so that relative rotation between said flyer and said elongated member wraps said strip material about said elongated member;

e. longitudinal drive means having a drum rotatable on said frame and a rope member connected to said drum and to said elongated member;

f. connecting means between said longitudinal drive means and said flyer so that rotation of said flyer causes rotation of said drum with attendant winding of said rope member on said drum and resultant predetermined linear movement of said wrapping apparatus with respect to said elongated member for each revolution of said flyer with respect to said elongated member.

2. The wrapping apparatus recited in claim 1 wherein said frame has a plurality of rollers engageable with said elongated member.

3. The wrapping apparatus recited in claim 2 wherein one roller of said rollers has biasing means for adjustably positioning said one roller against said elongated member.

4. The wrapping apparatus recited in claim 1 wherein said flyer has a first half section and a second half section removably connected to said first half section.

5. The wrapping apparatus recited in claim 1 wherein said strip material has a protective strip on one side of said strip material, and said apparatus has:

a. protective strip collecting means rotatable on said flyer between said strip material feeding means and said elongated member; and

b. said protective strip collecting means being adapted to receive the free end of said protective strip and operable by said strip material to remove said protective strip from said strip material before said strip material engages said elongated member and to store said removed protective strip.

6. The wrapping apparatus recited in claim 5 wherein said protective strip collecting means has a securing means for securing the free end of said protective strip collecting means.

7. The wrapping apparatus recited in claim 1 wherein said frame has a mounting ring projecting from said frame and said flyer rotates on said mounting ring.

8. The wrapping apparatus recited in claim 7 and having a plurality of rollers mounted on said mounting ring and engageable with said elongated member.

9. The wrapping apparatus recited in claim 7 wherein said mounting ring has a first half ring section and a second half ring section removably connected to said first half ring section.

10. The wrapping apparatus recited in claim 7 and having roller means between said flyer and said mounting ring.

11. The wrapping apparatus recited in claim 1 wherein said connecting means has:

a. a girth gear on said flyer; and

b. a pinion gear on said frame engageable with said girth gear and connected to said drum to rotate said drum when said girth gear is rotated by said flyer.

12. The wrapping apparatus recited in claim 1 and having strip tension means connected to said strip material feeding means for applying a predetermined tension to said strip material feeding means and said strip material.

13. The wrapping apparatus recited in claim 12 wherein said strip tensioning means has:

a. a friction brake engageable with said strip material feeding means; and

b. biasing means associated with with said fricion brake for applying a retarding force between said friction brake and said biasing means.

14. The wrapping apparatus recited in claim 1 and having spacer means on said drum for increasing the diameter of said drum thereby varying the linear velocity of said wrapping apparatus for each revolution of said flyer.

15. The wrapping apparatus recited in claim 1 and having positioning means on said frame for supporting said strip material feeding means and for varying the angular position of said strip material feeding means with respect to the longitudinal axis of said elongated member to provide a predetermined angle of incidence of said strip material with respect to said elongated member.

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