United States Patent

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[72] Inventor **William L. Schmidt**
Gastonia, N.C.

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[73] Assignee **Colman-Cocker Company**
Gastonia, N.C.

[54] **CONTINUOUS WEB HANDLING AND WINDING APPARATUS**
9 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** ..... **242/56 R,** 242/76
[51] **Int. Cl.** **B65h 19/20**
[50] **Field of Search** ..... 242/55, 56 R, 56.2, 56.6, 58.4, 67.1, 67.2, 76; 72/146, 148

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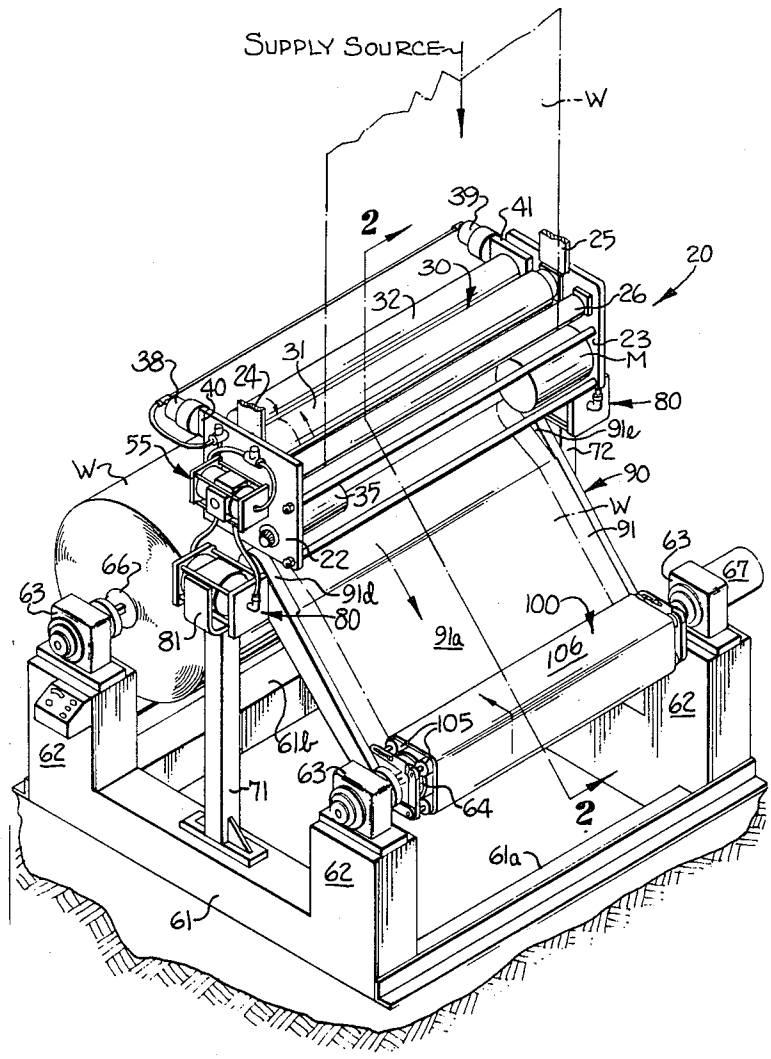
Primary Examiner—Stanley N. Gilreath
Assistant Examiner—Werner H. Schroeder
Attorney—Parrott, Bell, Seltzer, Park & Gibson

ABSTRACT: An apparatus for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations, including means for selectively feeding the web, means for severing the web to create a new leading end thereof, and at least a pair of spaced-apart mandrels for receiving and winding the web thereon. Guide means selectively guide a newly created leading end of the web toward a selected one of the mandrels and starting means responsive to the guide means selectively start the winding of the newly created leading end of the web around the selected one of the mandrels.



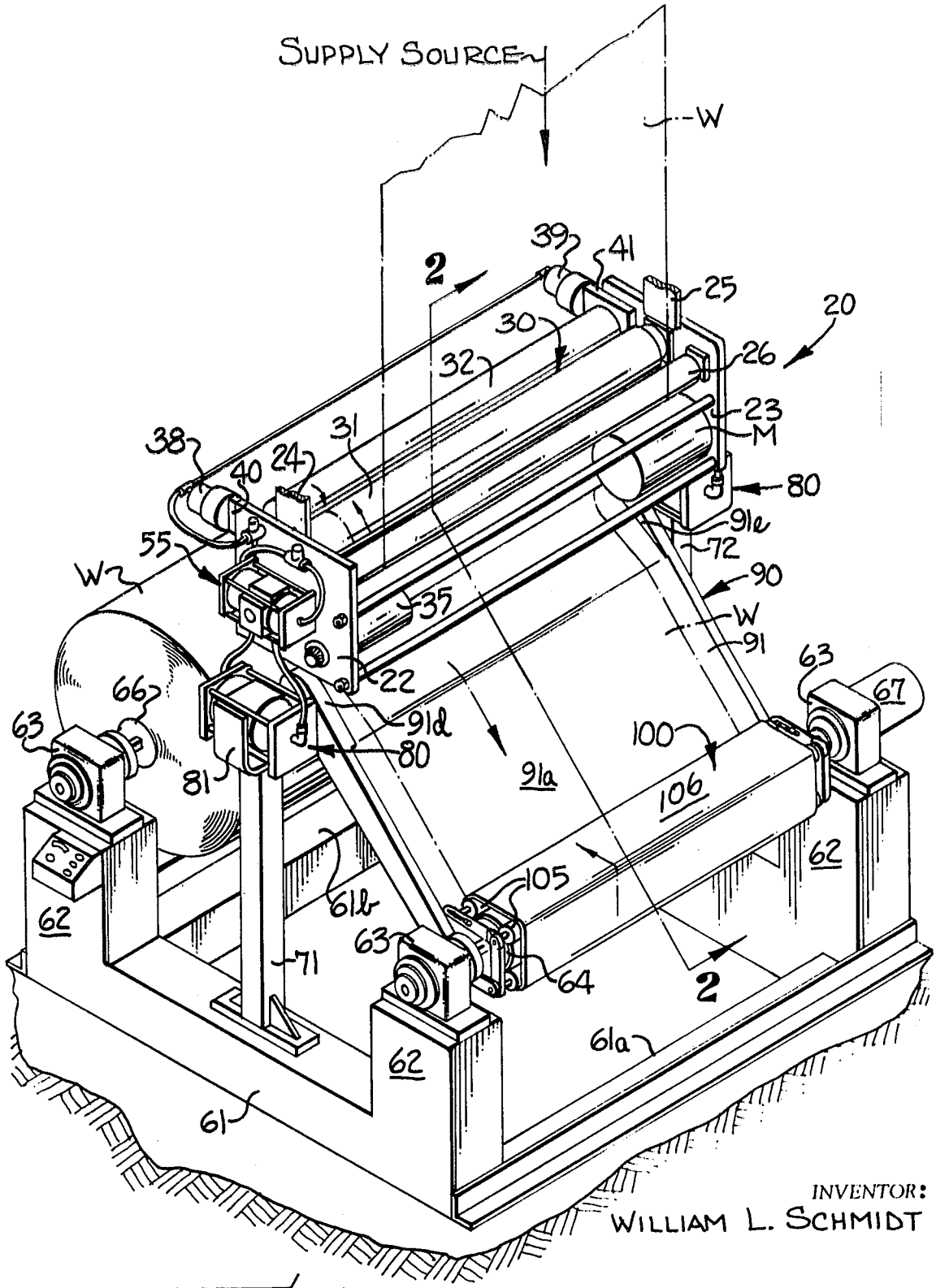
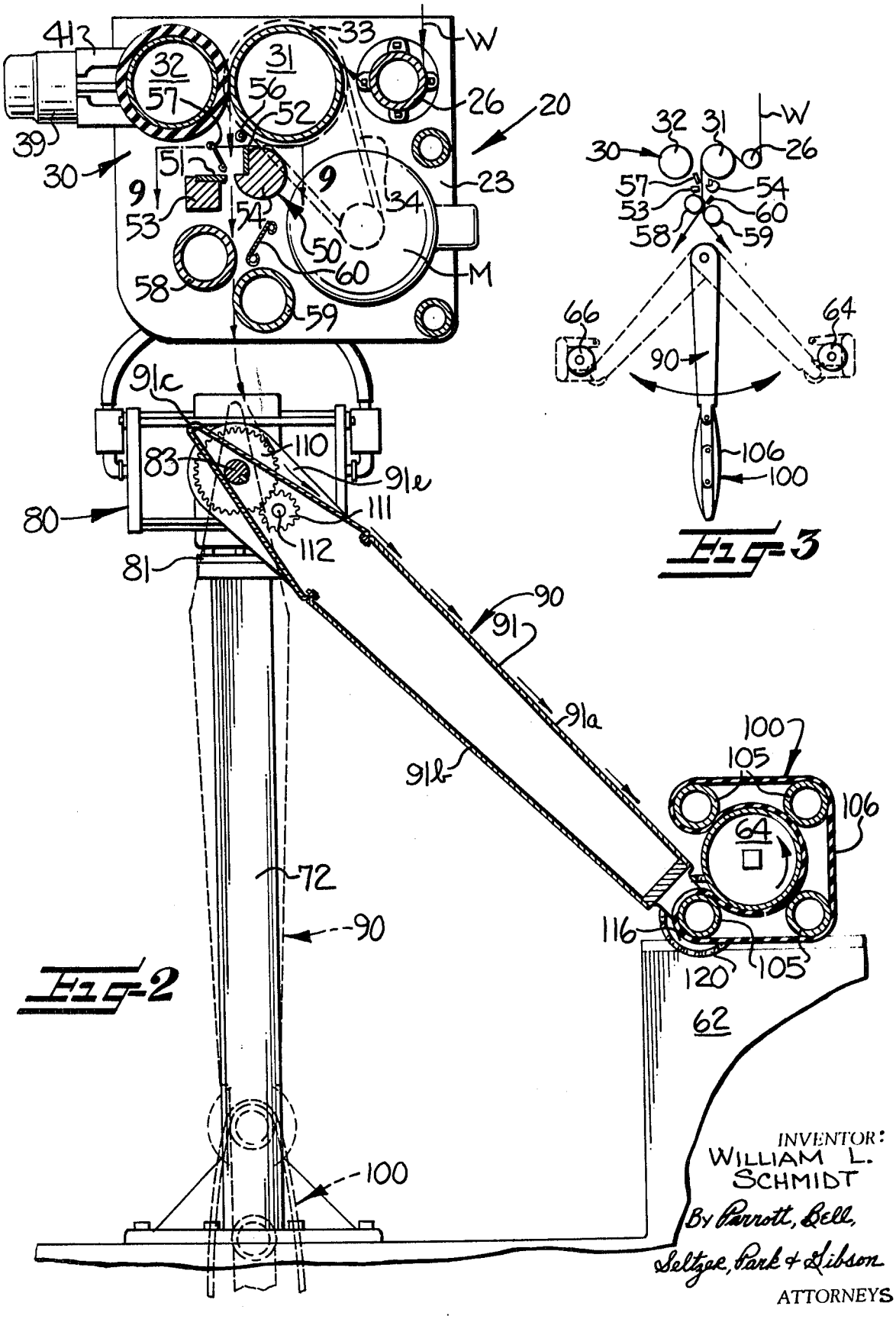


Fig-1

INVENTOR:
WILLIAM L. SCHMIDT

BY Barrett, Bell, Seltzer, Park & Gibson
ATTORNEYS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59
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110
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91e
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91a
91b
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INVENTOR:
WILLIAM L. SCHMIDT
By Parrott, Bell, Seltzer, Park & Gibson
ATTORNEYS

FIG-2

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FIG-3

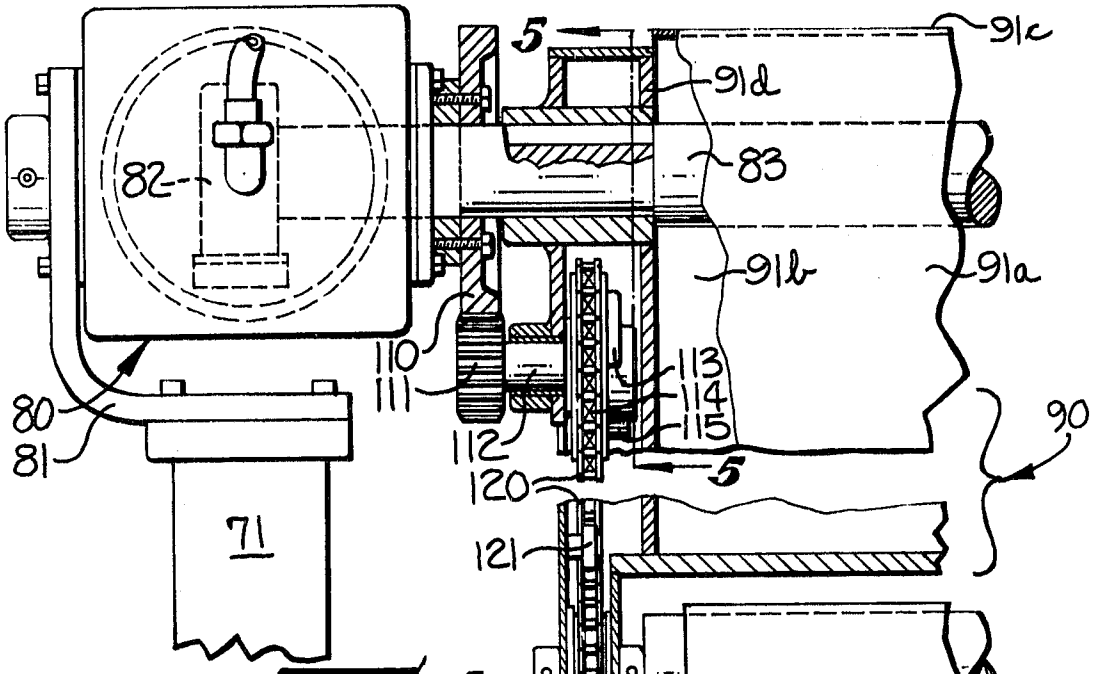

Fig-4

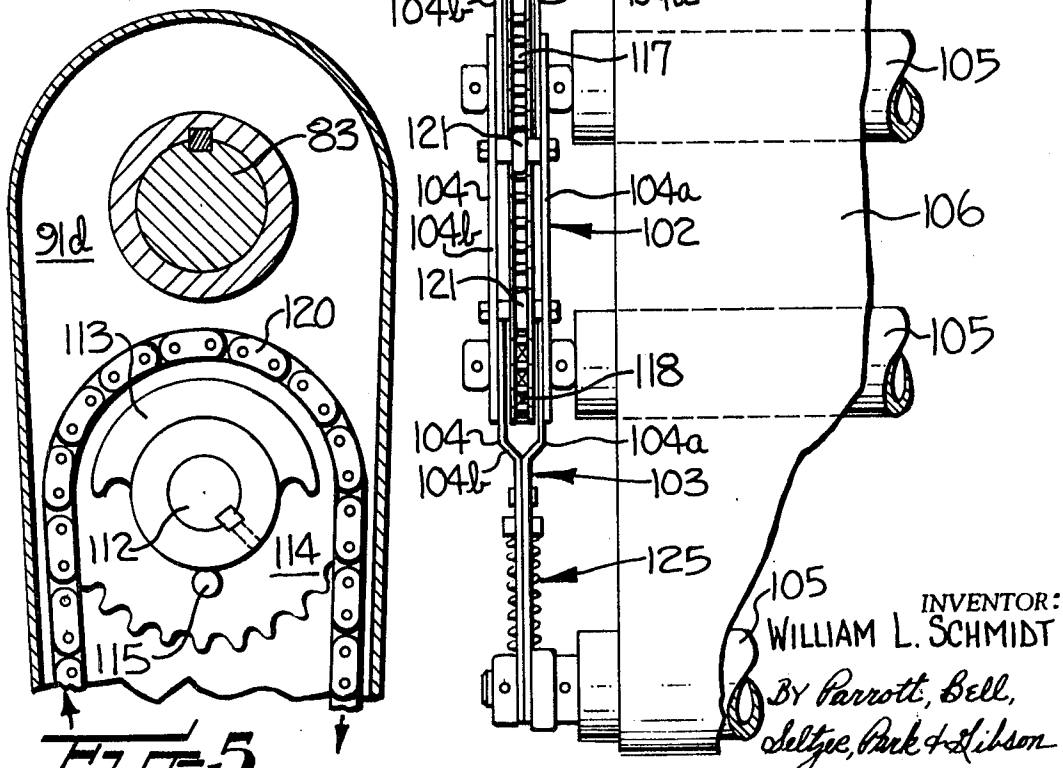

Fig-5

INVENTOR:
WILLIAM L. SCHMIDT
BY Parrott, Bell, Seltzer, Park & Gibson
ATTORNEYS

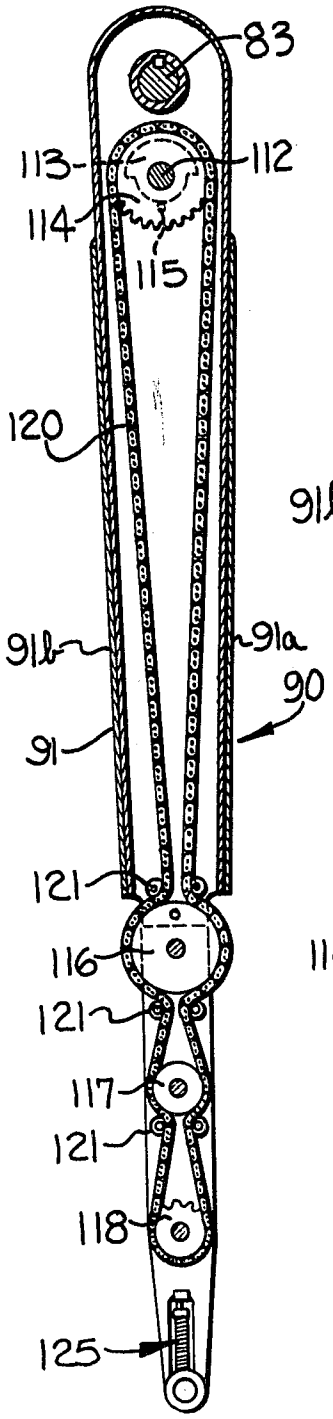

Fig-6

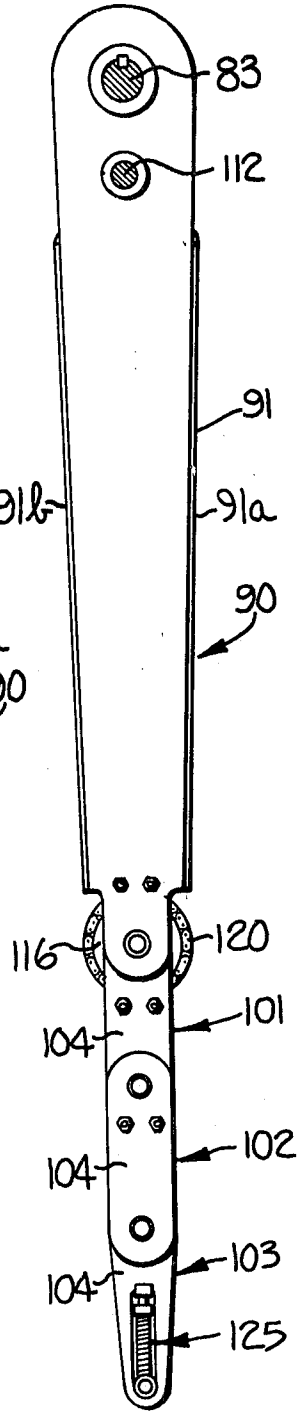

Fig-7

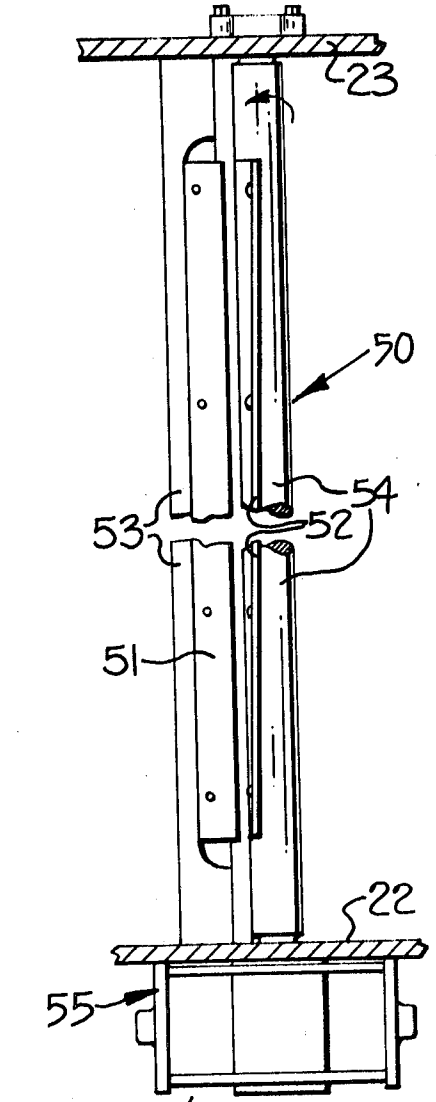

Fig-9

INVENTOR:
WILLIAM L. SCHMIDT

BY Parrott, Bell, Seltzer, Park & Gibson
ATTORNEY

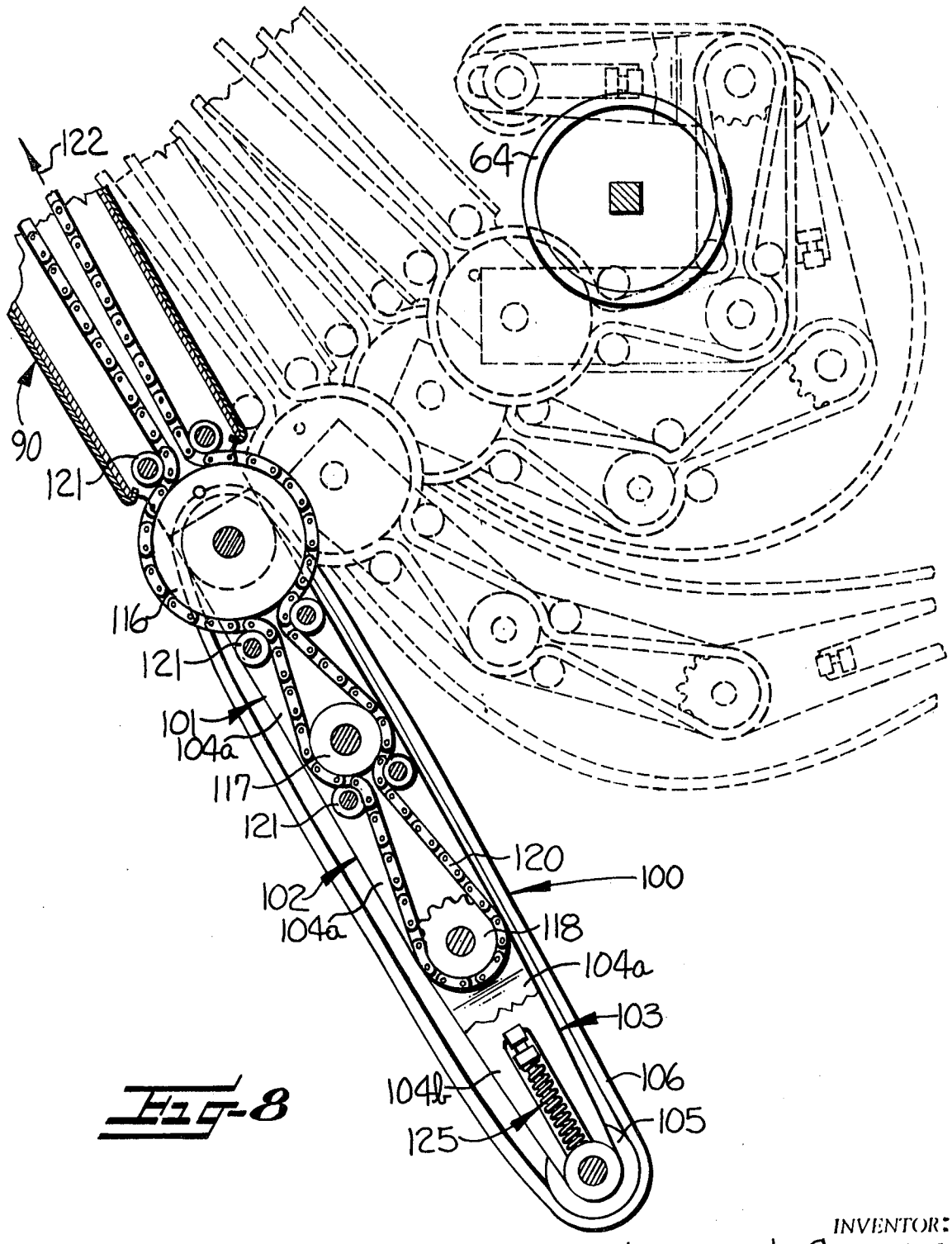

Fig-8

INVENTOR:
WILLIAM L. SCHMIDT

BY Parrott, Bell, Seltzer, Park & Gibson
ATTORNEYS

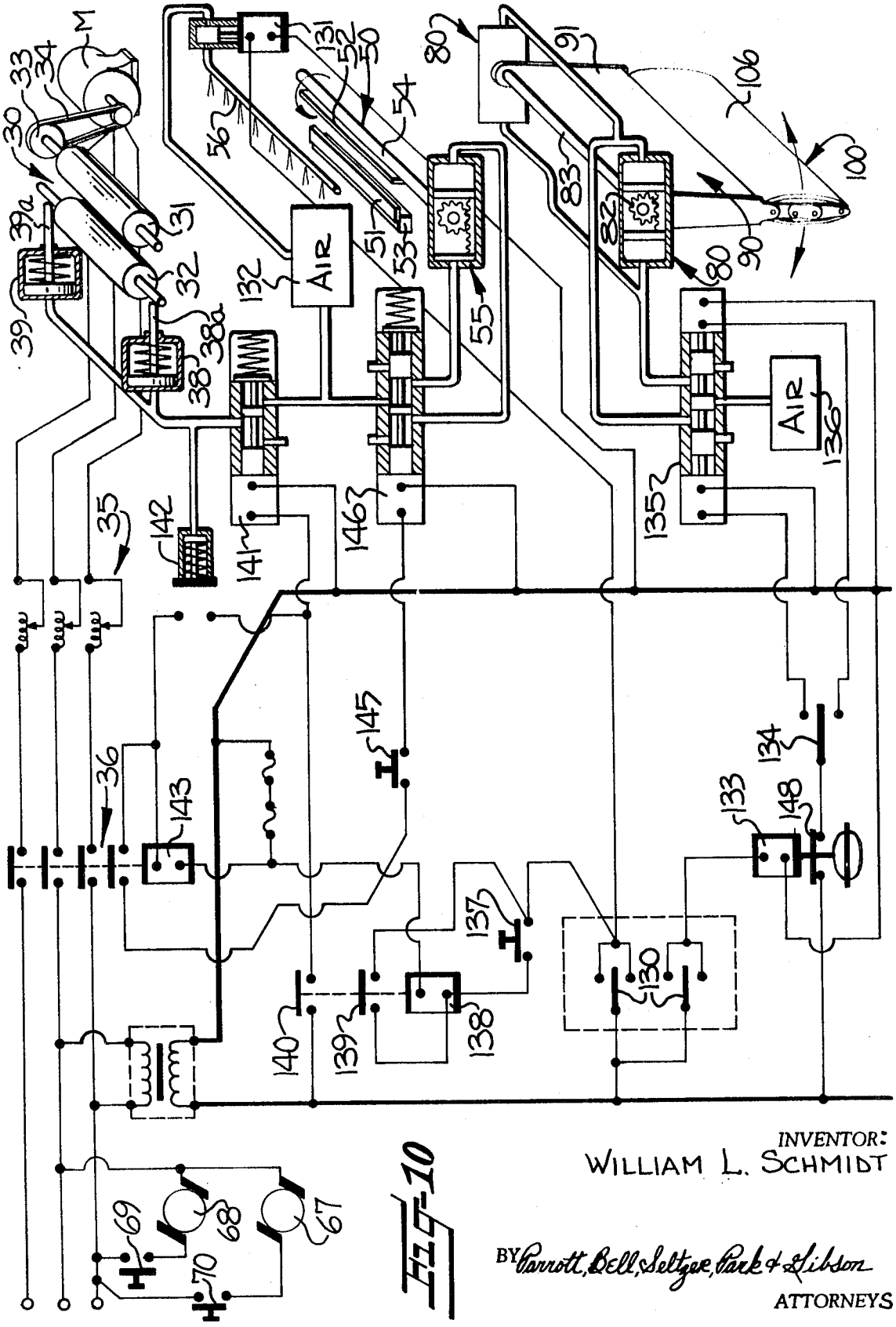

FIG-10

INVENTOR:
WILLIAM L. SCHMIDT

BY Parrott, Bell, Seltzer, Park & Gibson
ATTORNEYS

CONTINUOUS WEB HANDLING AND WINDING APPARATUS

This invention relates to an apparatus for handling and winding a continuous web and more particularly to an apparatus for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations.

In the winding of a continuous web such as fabric or the like, it is conventional practice to wind predetermined lengths of the web on successive mandrels or beams with the web being transversely severed between winding on successive mandrels.

Many apparatus heretofore been provided for the purpose of such winding. Typically, these winding apparatus include a single winding station which requires that the winding be discontinued during severing of the web to create a new leading end thereof, removal of the full mandrel, positioning an empty mandrel in the winding station, and starting the winding of the newly created leading end of the web around the empty mandrel. In addition, it has been common practice for most, if not all, of these steps to be carried out manually which in addition to limiting the production of the winding apparatus is costly and time consuming, in starting the newly created leading end of the web around an empty mandrel.

Other apparatus have been provided which include a plurality of winding stations to which the web may be selectively fed for the winding of the web on mandrels positioned therein. However, many of these apparatus, while allowing web to be wound at one of the winding stations while a full mandrel is being removed from the other winding station, have not alleviated manual starting of the web around an empty mandrel.

On the other hand, many web-winding apparatus have been devised of both the single and plural winding station type which include means for starting a newly created leading end of the web around an empty mandrel. However, these starting means have not proven to be entirely satisfactory for one or more reasons. In particular, these starting means have not been satisfactory due to the complexity of their structure, their unreliability and, more particularly, the necessity of having separate starting means for each winding station.

Thus, it is an object of this invention to provide an apparatus for handling and winding a continuous web including improved means for guiding a newly created leading end of the web toward a winding station and for starting the winding of the newly created leading end of the web.

Another object of this invention is to provide an apparatus for handling and winding a continuous web having a plurality of winding stations wherein the winding may be selectively transferred from one winding station to another without manual attention by the operator.

It is still another object of this invention to provide an apparatus for handling and winding a continuous web at a plurality of winding stations and including guide means and starting means for selectively guiding and starting a newly created leading end of the web around the selected one of the mandrels for the winding of the web thereon.

By this invention, the above objects are accomplished by providing an apparatus for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations wherein the apparatus comprises means for selectively feeding the web along a longitudinal path of travel, means disposed adjacent the path of travel for severing the web to create a new leading end of the web, at least a pair of space-apart mandrels for receiving and winding of the web thereon and defining winding stations, guide means operatively associated with the severing means and the mandrels and being movable relative to the mandrels between selective positions for selectively guiding the newly created leading end of the web from the severing means toward a selected one of the mandrels, and starting means operatively connected to the guide means and being responsive to movement thereof between the selective positions for positioning itself to direct and start the newly created leading end of the web around the selected one of the mandrels for winding of the web thereon.

In the preferred embodiment of the apparatus, the guide means comprises an elongate guide arm pivotally mounted at one end thereof adjacent the severing means in the longitudinal path of travel of the web and being selectively pivotal to one position for guiding a newly created leading end of the web from the severing means toward one of the mandrels and being selectively pivotal to another position for guiding another newly created leading end of the web from the severing means toward another of the mandrels and means for pivoting the guide arm between the selective positions. The starting means preferably comprises an elongate conveyor means carried at one end thereof by the end of the guide arm remote from the severing means and being contractable in response to movement of the guide arm between the selected positions around the selected one of the mandrels for receiving the newly created leading end of the web from the guide arm and directing it between the conveyor means and the selected one mandrel around the selected one mandrel to start the winding of the web therearound.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

FIG. **1** is a schematic perspective view of an apparatus constructed in accordance with the present invention for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations;

FIG. **2** is an enlarged sectional view taken substantially along the line **2—2** of FIG. **1**;

FIG. **3** is a schematic elevational view illustrating the operation of the apparatus for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations;

FIG. **4** is an enlarged fragmentary side elevational view with parts in sections and other parts broken away of the apparatus of FIG. **1** and illustrating the starting means thereof;

FIG. **5** is an enlarged sectional view taken substantially along the line **5—5** of FIG. **4**;

FIG. **6** is an enlarged elevational view of a portion of the apparatus of FIG. **1** with parts in section and illustrating the interconnection of the guide means and starting means;

FIG. **7** is an enlarged elevational view similar to that of FIG. **6** without parts being in section and further illustrating the interconnection of the guide means and starting means;

FIG. **8** is an enlarged view of the lower portion of the apparatus of FIG. **6** and illustrating in dotted lines the successive contraction of the starting means about a selected one of the mandrels;

FIG. **9** is an enlarged sectional view taken substantially along the line **10—10** of FIG. **2**; and

FIG. **10** is a wiring and pneumatic diagram schematically illustrating means for controlling the operation of the apparatus of FIG. **1**.

Referring specifically to FIG. **1**, there is schematically illustrated a winding apparatus, generally indicated at **20**, constructed in accordance with the present invention for winding a continuous web W at a plurality of winding stations. The winding apparatus **20** includes a pair of spaced-apart mounting plates **22** and **23** which, as illustrated, may be supported by support members **24** and **25**, respectively from the ceiling, not shown, of a building structure and as will be described carry the selective feeding means and severing means of the winding apparatus **20**.

A rotatable web guide roll **26** is journaled between mounting plates **22** and **23**. Adjacent guide roll **26** and between mounting plates **22** and **23**, there is mounted the means, generally indicated at **30**, for selectively feeding web W along a longitudinal path of travel. The selective feeding means **30** comprises a pair of cooperating feed rolls **31** and **32**. Feed roll **31**, preferably, has a smooth and substantially frictionless outer surface so that the web W may slip thereover when the selective feeding means **30** is not feeding the web W and may be formed of steel or the like.

As best illustrated in FIG. 2, feed roll 31 is drivingly connected by a pulley 33 and belt 34 to a drive motor M for driving rotation thereof. With reference to FIG. 10, it will be noted that drive motor M is a three-phase induction motor and has an attenuator 35 and relay switches 36 operatively connected thereto for selectively controlling the actuation thereof for driving of feed roll 31. The other feed roll 32, preferably, has a resilient and a high friction outer surface and, as illustrated in FIG. 2, may be a metal roll coated with rubber or other similar resilient and high friction material.

Feed roll 32 is journaled at opposite ends in mounting plates 22 and 23 for free rotation and sliding movement relative to plates 22 and 23 for selective positioning into and out of nipping or feeding relation with feed roll 31. Positioning of feed roll 32 is controlled by pneumatic means such as conventional spring-biased air-operated piston and cylinder assemblies 38 and 39 that are connected by links 40 and 41, respectively, to mounting plates 22 and 23. As diagrammatically illustrated in FIG. 10, the free ends of pistons 38*a* and 39*a* of piston and cylinder assemblies 38 and 39, respectively, are drivingly connected by suitable means, not shown, to opposite ends of feed roll 32 and are normally spring biased in a retracted position to normally maintain feed roll 32 out of nipping or feeding relation with feed roll 31 so that web W may freely pass therebetween. When it is desired to feed the web W by selective feeding means 30, feed roll 32 is positioned by cooperating piston and cylinder assemblies 38 and 39 in nipping or feeding relation with feed roll 31, as shown in FIG. 2, and drive motor M actuated to drive feed roll 31. Thus, feed rolls 31 and 32 will cooperate to feed the web W therebetween along a longitudinal path of travel.

Immediately beneath and in receiving relation to cooperating feed rolls 31 and 32 is severing means, generally indicated at 50, for selectively severing the web to create a new leading end thereof. As best illustrated in FIGS. 2 and 9, the severing means 50 comprises normally spaced-apart cooperating shearing blades 51 and 52 between which the web W passes. Shearing blade 51 is mounted on one side of the longitudinal path of the web W on a stationary bar 53 that extends transversely of web W between mounting plates 22 and 23. Shearing blade 52 is carried on the other side of the longitudinal path of the web W by an oscillatable shaft 54 that is journaled at opposite ends in mounting plates 22 and 23. One end of shaft 54 is drivingly connected to the pinion of an air-operated rack and pinion assembly, generally indicated at 55, which when actuated is capable of oscillating shaft 54 to bring shearing blade 52 into shearing relation with shearing blade 51 to transversely sever web W passing therebetween. Shearing blade 52 is preferably, as shown in FIG. 9, mounted in an offset relation to the longitudinal axis of shaft 54 in a longitudinally extending groove therein so that a scissorslike action is obtained by the cooperating shearing blades 51 and 52 to improve the shearing action thereof.

When the web W is severed by shearing blades 51 and 52, a new leading end of the web W is created. To facilitate in guiding a newly created leading end of the web W from the feed rolls 31 and 32 between shearing blades 51 and 52, an elongate tube 56 is disposed adjacent the path of web W parallel with and between feed roll 31 and shearing blade 52 as best shown in FIG. 2 and has a plurality of longitudinally spaced apertures therein through which air or the like may be selectively forced by means to be hereinafter described to form air jets. The apertures are positioned such that the air jets are directed toward the longitudinal path of the web W to deflect the same toward a guide plate 57 that guides the newly created leading end of the web W between the shearing blades 51 and 52.

Beyond the cooperating shearing blades 51 and 52 are a pair of guide rolls 58 and 59, which are spaced on opposite sides of the path of travel of the web W for further guiding the web W along a longitudinal path of travel and which prevent damage to the web W by the shearing blades 51 and 52. As noted in FIG. 2, the guide rolls 58 and 59 are disposed at slightly different elevations with a guide plate 60 cooperating therewith to insure that a newly created leading end of the web W will be fed from the severing means 50 between guide rolls 58 and 59.

With reference to FIG. 1, a generally rectangular frame 61, adapted to be supported on the floor F of a building structure or the like, is disposed centrally beneath the portion of the apparatus thus far described. At opposite ends 61*a* and 61*b* of frame 61 are identical pairs of spaced-apart upright stands 62. Each of the stands 62 having chucking and bearing assemblies 63 of conventional construction mounted thereon with the chucking and bearing assemblies 63 on each pair of stands 62 cooperating for removably and rotatably supporting mandrels 64 and 66, respectively, therebetween. Mandrel drive means in the form of drive motors 67 and 68 are drivingly connected to mandrels 64 and 66, respectively, by suitable means, not shown, for driving rotation thereof. As illustrated in FIG. 10, drive motors 67 and 68 have manual switches 69 and 70 operatively associated therewith, respectively, for controlling the actuation of motors 67 and 68 to drive mandrels 64 and 66.

Mandrels 64 and 66 define opposed, spaced-apart winding stations positioned symmetric with respect to web W passing from between guide rolls 58 and 59 and are equally capable of receiving and winding the web W thereon. Thus, in accordance with the apparatus 20 thus far described, web W may be drawn from a suitable supply source around guide roll 26, through the selective feeding means 30 and severing means 50 between guide rolls 58 and 59 and wound on either of the mandrels 64 and 66.

It is apparent that, when a predetermined amount of web W has been wound on one mandrel, the web W may be severed by severing means 50 and the newly created leading end selectively fed along a longitudinal path of travel by selective feeding means 30. However, means are needed for selectively guiding the newly created leading end of the web W toward the other mandrel and for starting the newly created leading end of the web W around the mandrel for the winding of the web thereon.

Thus, extending upwardly from opposite sides of rectangular frame 61 are pedestals 61 and 72 between which is carried means in accordance with the present invention for selectively guiding a newly created leading end of the web W from between the guide rolls 58 and 59 toward a selected one of the mandrels 64 and 66 and for starting the newly created leading of the web W around the selected one of the mandrels 64 and 66 for the winding of the web W thereon. More particularly, as best shown in FIGS. 2 and 4, cooperating air-operated rack and pinion assemblies 80 are mounted by L-shaped brackets 81 on each of the pedestals 71 and 72 with the pinions 82 thereof being connected by a main shaft 83 which is oscillatable in opposite directions between first and second selective positions upon selective actuation of the air-operated rack and pinion assemblies 80, the operation of which will hereinafter more fully described.

The guide means of the present invention is generally indicated at 90 and is mounted on main shaft 83 and comprises an elongate guide arm 91, as best shown, in FIG. 2. The guide arm 91 includes suitably spaced-apart sidewalls 91*a* and 91*b* which converge together at one end to form an apex 91*c*. Main shaft 83 is disposed between sidewalls 91*a* and 91*b* adjacent apex 91*c* and is keyed to guide arm 91 at opposite sides 91*d* and 91*e* thereof to mount the end of guide arm 91 having the apex 91*c* adjacent severing means 50 in the longitudinal path of a newly created leading end of the web W. Thus, guide arm 91 may be selectively pivoted between first and second positions adjacent mandrels 64 and 66, respectively.

As in FIG. 2, upon pivoting guide arm 91 toward a selected one of the mandrels 64 and 66, the apex 91*c* thereof will be shifted to one side of the path of the longitudinal web W so that a newly created leading end of the web W will engage one of the sidewalls 91*a* and 91*b* of guide arm 91 and be guided along the contour thereof toward the selected mandrel.

In order to start a newly created leading end of the web W around the selected one of the mandrels **64** and **66**, starting means, generally indicated at **100**, is operatively connected to guide means **90**. The starting means **100** is so constructed and arranged that it is responsive to movement of the guide means **90** toward a selected one of the mandrels **64** and **66** to position itself to direct and start the newly created leading end of the web around the selected mandrel **64** and **66** for the winding of the web W thereon. With reference to FIGS. **1**, **5** and **7**, the starting means **100** comprises a plurality of elongate endless conveyor-belt-supporting segments **101**, **102**, and **103** which are successively interconnected for pivoting movement relative to each other and to the guide arm **91**. More particularly, segment **101** is pivotally connected to an extension of the end of guide arm **91** remote from severing means **50** and it to intermediate supporting segment **102**. Intermediate segment **102** is in turn pivotally connected to the terminal segment **103**.

Conveyor belt supporting segments **101**, **102**, and **103** are similar in construction, thus, like parts of each will be designated by like reference numerals. Each segment **101**, **102**, and **103** includes a pair of spaced-apart, elongate, supporting links **104** and each supporting link **104** in turn includes spaced apart plates **104***a* and **104***b*. The supporting links **104** of each segment are successively interconnected, as shown, in FIG. **4**, for pivoting movement relative to each other and to guide arm **91**. Pairs of supporting links **104** adjacent their ends are interconnected by cooperating rotatable pulleys **105**. An endless conveyor belt **106** is trained around pulleys **105** and is contractable with the pulleys **105** upon pivoting movement of the successively interconnected supporting segments **101**, **102**, and **103**.

In order to pivot the successively interconnected supporting segments **101**, **102**, and **103** to contract conveyor belt **106** around the selected mandrel **64** and **66** to which a newly created leading end of the web W is directed by guide arm **91** as schematically illustrated in FIGS. **1** and **3**, drive means is provided which is responsive to movement of the guide arm **91** toward the selected mandrel. In particular, each of the air-operated rack and pinion assemblies **80** have a stationary gear **110**, as best shown in FIG. **4**, carried thereby concentric of main shaft **83**. Follower gears **111** are carried by rotatable shafts **112** at opposite sides **91***d* and **91***e* of guide arm **91** and mesh with stationary gears **110**. Upon pivoting movement of guide arm **91**, follower gears **111** follow stationary gears **110** to rotate shafts **112**. Shafts **112** have eccentric cams **113** mounted thereon for rotation with shaft **112**. Circular sprockets **114**, FIG. **5**, are freely mounted on shafts **112** adjacent cams **113** and have pins **115**, respectively, which are engaged by cams **113** upon pivoting of guide arm **91** beyond predetermined limits toward a selected mandrel to rotate sprockets **114**.

As best illustrated in FIGS. **4** and **6**, separate sprockets **116**, **117**, and **118** are carried by supporting links **104** between plates **104***a* and **104***b*. It will be noted that sprockets **116** and **117** are smooth. Drive chains **120** interconnect sprockets **114**, **116**, **117** and **118**, as best illustrated in FIG. **6**. Since sprockets **116** and **117** are smooth, chain guide rolls **121** are provided in cooperation therewith for conforming the drive chains **120** therearound in frictional engagement with the sprockets **116** and **117**.

Thus, it can be seen that as guide arm **91** is pivoted toward a selected one of the mandrels **64** and **66**, drive sprockets **114** will be rotated to drive drive chains **120** and rotate the other interconnected sprockets **116**, **117**, and **118** to pivot the supporting segments **101**, **102**, and **103** relative to each other and the guide arm **91** to contact the endless conveyor belt **106** around the selected mandrel. With reference to FIG. **8**, there is shown in dotted lines the successive stages in the contraction of conveyor belt **106** around mandrel **64** upon movement of the guide arm **91** toward mandrel **64**. The full lines represent the position of the conveyor belt **106** just before the pins **115** of drive sprockets **114** are engaged by cams **113** to start rotation of drive sprockets **114** and the drive chains **120** carried thereby. In the illustration of FIG. **8**, the drive chain **120** moves in the direction indicated by the arrow **122** to pivot the conveyor belt supporting segments **101**, **102**, and **103** in a counterclockwise direction relative to each other and guide arm **91**. The relative movement between the various segments and guide arm **91** is determined by the relative sizes of sprockets **116**, **117** and **118** and the friction characteristics thereof with drive chains **120**.

As will be apparent, the relative movement should be as schematically illustrated in FIG. **8** so that endless conveyor belt **106** is contracted around the selected mandrel. In order to prevent loosing of the conveyor belt **106** during its contraction around the selected mandrel, the terminal pulley **105** is spring biased by conventional means **125** outwardly and longitudinally of conveyor-belt-supporting segment **103**. With conveyor belt **106** tightly entrained around pulleys **105** and contracted around the selected mandrel, the conveyor belt **106** may be driven by the frictional engagement thereof with the selected mandrel. Thus, web W will be received from the guide arm **91** between conveyor belt **106** and the selected mandrel and directed around the selected mandrel for the winding of the web W thereon.

During normal operation of the winding apparatus **20** of the present invention the continuous web W is drawn from some suitable supply source as indicated in FIG. **1** under guide roll **26**, over feed roll **31**, between feed rolls **31** and **32**, through severing means **50** and between guide rolls **58** and **59** to one of the rotatably driven mandrels **64** and **66** on which the web W is wound. Motor M for driving feed roll **31** is idle during this time and feed roll **32** is out of feeding relation with feed roll **31** so that web W is free to slip over feed roll **31**.

Referring specifically to FIG. **10**, there is schematically illustrated an example of a wiring and pneumatic control diagram for the winding apparatus **20** and from which the operation of the apparatus **20** will be described. Upon the winding of a predetermined amount of web W on a given mandrel, the rotation of that mandrel is discontinued by manually opening the appropriate control switch **69** and **70** to discontinue the winding of web W and its passage through the winding apparatus **20**. Attenuator **35** is checked to insure that is adjusted so that feed roll **31** will not be driven by motor M upon the closing of switches **36** and the appropriate switch **69** and **70** closed to drive the other mandrel. Master switches **130** are closed to energize a solenoid-actuated air valve **131** to supply air from a compressed air source **132** through tube **56** to establish air jets against the web W and to energize a time delay relay **133**. Immediately thereafter, mandrel selective switch **134** is positioned to energize a double-acting solenoid-actuated air valve **135** to supply air from a compressed air source **136** to the proper side of the air-operated rack and pinion assemblies **80** to cause guide arm **91** to pivot from its normally inactive position to an active position adjacent the selected mandrel. During movement of the guide arm **91**, the converyor-belt-supporting segments **101**, **102**, and **103** will be pivoted relative to each other and the guide arm **91** to contract the conveyor belt **106** around the selected mandrel. The frictional engagement of conveyor belt **106** with the mandrel drives the conveyor belt **106** in synchronism with the mandrel.

After positioning mandrel selective switch **134**, normally open spring-biased switch **137** is closed to energize relay switches **139** and **140**. The closing of relay **139** establishes a holding circuit for relay **138** while the closing of relay switch **140** energizes a solenoid-actuated air valve **141**. Actuation of valve **141** causes air to be supplied from compressed air source **132** to air-operated piston and cylinder assemblies **38** and **39** to move feed roll **32** into nipping or feeding relation with feed roll **31**. Simultaneously with the supply of air to piston and cylinder assemblies **38** and **39**, air is supplied to normally open pneumatic switch **142** to close the same and energize relay **143** and close relay switches **36**, previously described. Since the attenuator **35** is set so that the closing of relay switches **36** does not actuate motor M to drive feed roll **31**, the web W will be nipped between feed rolls **31** and **32**.

Normally open, severing switch **145** is now closed to energize solenoid-actuated air valve **146** to supply air from compressed air source **132** to rack and pinion assembly **55** to oscillate shaft **54** and bring shearing blade **52** into cooperation relation with shearing blade **51** to transversely sever the web W and create a new leading end of the web W.

Severing switch **145** is opened to return shaft **54** to its normal position. The attenuator **35** is now adjusted to feed the web W along a longitudinal path of travel. As the web W is fed, the newly created leading end of the web W is guided by the air jets from tube **56** and guide plate **57** between shearing blades **51** and **52** and guide rolls **58** and **59**. From the guide rolls **58** and **59** the newly created leading end of the web W is guided by guide arm **91** toward the selected mandrel and is received by conveyor belt **106** of starting means **100** and directed between the conveyor belt **106** and the selected mandrel to start the winding of the web W thereon.

After time delay relay **133** times out, normally closed relay switch **148** opens to deenergize double-acting solenoid-actuated air valve **135** so that air will be exhausted from rack and pinion assemblies **80**. The weight of the guide means **90** and starting means **50** then cause the same return their normally inactive position. As will be apparent, it will be necessary to manually reset switches **130** and **134** for the next operation of the apparatus **20**. Preferably, these switches are reset immediately so that feed roll **32** will be moved out of nipping relation with feed roll **31** and drive motor M deenergized and the winding to the other mandrel.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

What is claimed is:

1. An apparatus for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations, said apparatus comprising

means for selectively feeding the web along a longitudinal path of travel,

means disposed adjacent the path of travel of the web for severing the web to create a new leading end of the web,

at least a pair of spaced-apart mandrels for receiving and winding the web thereon and defining winding stations,

guide means operatively associated with said severing means and said mandrels and being movable relative to said mandrels between selective positions for selectively guiding the newly created leading end of the web from said mandrels, and

starting means operatively connected to said guide means and being responsive to movement thereof between said selective positions for positioning itself to direct and start the newly created leading end of the web around the selected on of said mandrels for winding of the web thereon.

2. An apparatus, as set forth in claim **1**, wherein said starting means comprises elongate conveyor means carried at one end thereof by said guide means and being contractable in response to movement of said guide means between said selective positions to position itself around the selected one of said mandrels for receiving a newly created leading end of the web from said guide means and directing it between said conveyor means and said one mandrel around said one mandrel to start the winding of the web around said one mandrel.

3. An apparatus, as set forth in claim **2**, wherein said conveyor means comprises

a plurality of elongate endless conveyor belt-supporting segments successively interconnected for pivoting movement relative to each other and to said guide means,

and endless conveyor belt trained around said successively interconnected, pivotal, supporting segments, and

drive means responsive to movement of said guide means between said selective positions for pivoting said supporting segments relative to each other and to said guide means to contract said conveyor belt around said one mandrel.

4. An apparatus, as set forth in claim **3**, wherein said plurality of conveyor-belt-supporting segments comprise a plurality of pairs of spaced-apart elongate, interconnected supporting links, said plurality of pairs of supporting links being successively interconnected for pivoting movement relative to each other and to said guide means, and a pulley rotatably mounted between each of said pairs of supporting links, and wherein said endless conveyor belt is trained around said pulleys.

5. An apparatus, as set forth in claim **4**, wherein said drive means comprises

drive sprocket means operatively connected to said guide means for selective rotation thereby in opposite first and second directions in accordance with movement of said guide means between said selective positions,

separate sprocket means rigidly carried by each of said pairs of supporting members, and

drive chain means interconnecting each of said sprocket means for pivoting said plurality of successively interconnected pairs of supporting links links relative to each other and to said guide means in response to rotation of said drive sprocket upon movement of said guide means between said selective positions to contract said conveyor belt around said one mandrel.

6. An apparatus, as set forth in claim **1**, wherein said guide means comprises

an elongate guide arm pivotally mounted at one end thereof adjacent said severing means in the longitudinal path of travel of the web, said guide arm being selectively pivotal to one position for guiding a newly created leading end of the web from said severing means toward one of said mandrels and being selectively pivotal to another position for guiding another newly created leading end of the web from said severing means toward another of said mandrels, and

means for pivoting said guide arm between said selective positions.

7. An apparatus for selectively feeding, guiding, starting and winding a continuous web at a plurality of winding stations, said apparatus comprising

means for selectively feeding the web along a longitudinal path of travel,

means disposed adjacent the path of travel of the web for severing the web to create a new leading end of the web,

a pair of spaced-apart mandrels for receiving and winding the web thereon and defining winding stations,

an elongate guide arm pivotally mounted at one end thereof adjacent said severing means in the longitudinal path of travel of the web, said guide arm being selectively pivotal between a first and second position for selectively guiding the newly created leading end of the web from said severing means toward a selected one of said mandrels,

means for pivoting said guide arm between said first and second positions, and,

elongate conveyor means carried at one end thereof by the end of said guide arm remote from said severing means and being contractable in response to movement of said guide arm between said first and second positions around the selected one of said mandrels for receiving the newly created leading end of the web from said guide arm and directing it between said conveyor means and said one mandrel around said one mandrel to start the winding of the web around said one mandrel.

8. An apparatus, as set forth in claim **7**, wherein said conveyor means comprises

a plurality of elongate endless conveyor-belt-supporting segments successively interconnected for pivoting movement relative to each other and to said guide arm,

an endless conveyor belt trained around said successively interconnected, pivotal supporting segments,

drive sprocket means operatively connected to said guide arm for selective rotation thereby in opposite first and second directions in accordance with movement of said guide means between said first and second positions,

separate sprocket means rigidly carried by each of said conveyor-belt-supporting segments, and

drive chain means interconnecting each of said sprocket means for pivoting said plurality of successively interconnected conveyor-belt-supportinng segments relative to each other and said guide means in response to rotation of said drive sprocket upon movement of said guide means between said first and second positions to selectively contract said conveyor belt around said one mandrel.

9. An apparatus for feeding, guiding, starting and winding a continuous web at a winding station, said apparatus comprising

means for selectively feeding the web along a longitudinal path of travel,

means disposed adjacent the path of the web for severing the web to create a new leading end of the web,

at least one mandrel for receiving and convolute winding the web thereon and defining a winding station,

guide means operatively associated with said severing means and said at least one mandrel and being movable from an inactive to an active position for guiding a newly created leading end of the web from said severing means toward said at least one mandrel,

a plurality of elongate endless conveyer-belt-supporting segments successively interconnected for pivoting movement relative to each other and pivotally connected at one end thereof to said guide means,

an endless conveyor belt trained around said successively interconnected, pivotal supporting segments,

drive sprocket means operatively connected to said guide means for selective rotation thereby in opposite first and second directions in accordance with movement of said guide means between said inactive and active positions,

separate sprocket means rigidly carried by each of said conveyor-belt-supporting segments, and

drive chain means interconnecting each of said sprocket means pivoting said plurality of successively interconnected conveyor-belt-supporting segments relative to each other and said guide means in response to rotation of said drive sprocket upon movement of said guide means from said inactive to said active position to contract said conveyor belt around said one mandrel to direct and start the newly created leading end of the web around said one mandrel for winding of the web thereon.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,604,648 Dated September 14, 1971

Inventor(s) William L. Schmidt

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The line numbers listed below are actual lines since the line numbers in the patent do not correspond to the actual line count.

Column 1, line 10 ... after "apparatus" insert --have--
line 20 ... after "consuming," insert --not to mention the danger to the operator, particularly,--
Column 4, line 41 ... the second instance of "61" should be --71--
line 54 ... after "will" insert --be--
Column 5, line 69 ... "64" should be --66--
line 70 ... "64" should be --66--
Column 6, line 40 ... after "that" insert --it--
line 61 ... after "relay" insert --switch--
Column 7, line 04 ... "cooperation" should be --cooperating--
line 28 ... after "winding" insert --apparatus 20 made ready for transferring the winding--
line 46 ... after "from" insert --said severing means toward a selected one of --
line 52 ... "on" should be --one--
Column 8, line 19 ... delete second instance of "links"
Column 10, line 14 ... after "means" insert --for--

Signed and sealed this 18th day of April 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents