

US Patent & Trademark Office

Patent Public Search | Text View

United States Patent Application Publication

20250262695

Kind Code

A1

Publication Date

August 21, 2025

Inventor(s)

LAL; Praneel Prithvi et al.

TANGLESS HELICALLY COILED INSERT INSTALLATION SYSTEM

Abstract

An automated installation system, constructed to install tangleless helically coiled inserts, includes an installation tool, a track, and an insert separator device. The tool includes a nozzle body defining a through-bore extending along an insertion axis, and a mandrel adapted to reciprocate and rotate within the bore. The track defines a channel extending along a first centerline for the travel of inserts disposed in the channel and to the installation tool. The device is mounted to the track and includes a shuttle adapted to intersect and move in the channel. The shuttle defines a through-bore having an axis aligned to the first centerline when in a first position for acceptance of an insert from the channel, and is aligned to a second centerline for expulsion of the insert from the track and into the installation tool. The second centerline is offset from the first centerline, and intersects the insertion axis.

Inventors: LAL; Praneel Prithvi (Lynbrook, Victoria, AU), RODRIGUEZ CANTOR; Diego Adolfo (Pakenham, Victoria, AU)

Applicant: HOWMET AEROSPACE INC. (Pittsburgh, PA)

Family ID: 1000008586168

Appl. No.: 18/857368

Filed (or PCT Filed): May 10, 2022

PCT No.: PCT/US2022/028555

Publication Classification

Int. Cl.: B23P19/00 (20060101)

U.S. Cl.:

Background/Summary

BACKGROUND

[0001] The present disclosure relates to a tool, and more particularly to an installation system for installing a tangless helically coiled insert.

[0002] Helically coiled inserts are generally used within tapped holes of a parent material. Some known helically coiled inserts have tangs which must be removed after insertion into the tapped holes. Tangless helically coiled inserts are beneficial since they have no tangs to remove.

Unfortunately, the known tools for installing tangless helically coiled inserts must first be manually, and individually, loaded into an insertion tool prior to driving the inserts into the tapped hole via the tool. In addition, known tools are known to have pitching errors and cross-threading problems between the tapped hole and the insert. It is desirable to develop an automated system where inserts are automatically fed to an insertion tool that upon receipt of the insert automatically installs the insert.

SUMMARY

[0003] An installation tool according to one, non-limiting, embodiment of the present disclosure is adapted to install tangless, helically coiled, inserts into a tapped hole. The installation tool comprises a tubular body extending along an insertion axis, the tubular body including a first end portion and an opposite second end portion, wherein the tubular body includes an internal surface defining a through-bore centered to the insertion axis and communicating through the first and second end portions, and a direction of insert travel is from the first end portion and through the second end portion along the insertion axis; an insert exit port defined by the internal surface at the second end portion, centered about the insertion axis, and in communication with the through-bore, wherein the through-bore includes a bore diameter that is larger than a port diameter of the insert exit port; an insert entry port defined by the first end portion and in communication with the through-bore; and a mandrel including a drive attachment end segment and an opposite threaded end segment, the mandrel including a staging position wherein the threaded end segment is axially displaced out of the tubular body enabling receipt of the tangless helically coiled insert through the insert entry port and into the through-bore, and a staged position wherein the tangless helically coiled insert is threaded upon the threaded end segment and is radially contracted via biased contact against the internal surface at the insert exit port.

[0004] Additionally to the foregoing embodiment, the internal surface converges radially inward from bore diameter and to the port diameter.

[0005] In the alternative or additionally thereto, in the foregoing embodiment, the installation tool further includes a tubular structure extending axially outward from the first end portion and defining a chamber extending along the insertion axis and in communication with the through-bore, wherein the threaded end segment is in the chamber when in the staging position.

[0006] In the alternative or additionally thereto, in the foregoing embodiment, the installation tool further comprises a feed tube extending along a centerline and being in communication with and projecting upstream from the insert entry port.

[0007] In the alternative or additionally thereto, in the foregoing embodiment, an obtuse angle is measured between the insertion axis at the tubular body and the centerline.

[0008] In the alternative or additionally thereto, in the foregoing embodiment, the through-bore at the first end portion is cylindrical and has the bore diameter.

[0009] In the alternative or additionally thereto, in the foregoing embodiment, the second end portion includes a reduction nozzle defining in-part the through-bore and including the insert exit

port, wherein the portion of the through-bore at the reduction nozzle is frustum shaped.

[0010] In the alternative or additionally thereto, in the foregoing embodiment, the bore diameter is greater than an external diameter of the tangless helically coiled insert when in an unbiased state, and the port diameter is less than the external diameter.

[0011] In the alternative or additionally thereto, in the foregoing embodiment, the installation tool further comprises an insert removal device engaged to the first end portion and disposed axially proximate to the insert entry port, the insert removal device including a block constructed to extend into and out of the through-bore to remove slipped tangless helically coiled inserts from the threaded end segment when the threaded end segment is axially aligned to the block.

[0012] In the alternative or additionally thereto, in the foregoing embodiment, rotation of the mandrel when the block is extended causes contact of an end of the tangless helically coiled insert with the block and thus unthreading of the tangless helically coiled insert from the threaded end segment.

[0013] An automated installation system, according to another non-limiting embodiment of the present disclosure installs tangless helically coiled inserts, The installation system comprises an installation tool including a nozzle body defining a through-bore extending along an insertion axis, and a mandrel adapted to reciprocate and rotate within the bore; a track defining a channel extending along a first centerline for the travel of a plurality of tangless helically coiled inserts disposed in the channel and to the installation tool; and an insert separator device mounted to the track and including a shuttle adapted to intersect and move in the channel, wherein the shuttle defines a through-bore having an axis aligned to the first centerline when in a first position for acceptance of a tangless helically coiled insert from the channel, and aligned to a second centerline for expulsion of the tangless helically coiled insert from the track and into the installation tool, wherein the first centerline is offset from the second centerline and the second centerline intersects the insertion axis.

[0014] Additionally to the foregoing embodiment, the installation system further comprises a feed tube extending along the second centerline, wherein the feed tube is disposed upstream from the installation tool and downstream from the track, and is in communication with the bore.

[0015] In the alternative or additionally thereto, in the foregoing embodiment, the nozzle body defines an insert entry port in communication with the bore and centered about the second centerline, and the feed tube is engaged to the nozzle body and is in communication with the insert entry port, and wherein an obtuse angle is measured between the insertion axis and the second centerline at the feed tube.

[0016] In the alternative or additionally thereto, in the foregoing embodiment, the installation system further comprises a vacuum delivery device including a conduit for the transport of the plurality of tangless helically coiled inserts along the second centerline from the track and into the feed tube.

[0017] In the alternative or additionally thereto, in the foregoing embodiment, the plurality of tangless helically coiled inserts are aligned end-to-end in the channel.

[0018] In the alternative or additionally thereto, in the foregoing embodiment, the installation system further comprises an insert holding device mounted to the track and spaced upstream from the insert separator device, the insert holding device including a pin adapted to transversely reciprocate into and out of the channel for blocking travel of the plurality of tangless helically coiled inserts in the channel.

[0019] In the alternative or additionally thereto, in the foregoing embodiment, the installation system further comprises an insert presence sensor mounted to the track and disposed between the insert separator device and the insert holding device, the sensor configured to detect the presence of a tangless helically coiled insert immediately upstream of the shuttle when the through-bore of the shuttle is axially aligned to the second centerline.

[0020] In the alternative or additionally thereto, in the foregoing embodiment, the installation

system further comprises a vibrating bowl assembly located upstream from the track and including a bowl and a helically coiled shelf, the bowl including an internal face defining a containment for the storage of a plurality of tangless helically coiled inserts, and the helically coiled shelf projecting laterally inward from the internal face for the travel of the plurality of tangless helically coiled inserts in a single line formation and into the channel.

[0021] In the alternative or additionally thereto, in the foregoing embodiment, the track defines a plurality of air holes in communication with and axially spaced along the track to propel the plurality of tangless helically coiled inserts.

[0022] In the alternative or additionally thereto, in the foregoing embodiment, the plurality of air holes are each angled toward the channel in a downstream direction for the flow of air into the channel.

[0023] The foregoing features and elements may be combined in various combinations without exclusivity, unless expressly indicated otherwise. These features and elements as well as the operation thereof will become more apparent in light of the following description and the accompanying drawings. However, it should be understood that the following description and drawings are intended to be exemplary in nature and non-limiting.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] Various features will become apparent to those skilled in the art from the following detailed description of the disclosed non-limiting embodiments. The drawings that accompany the detailed description can be briefly described as follows:

[0025] FIG. 1 is a perspective view of a tangless helically coiled insert installation system as one, non-limiting, exemplary embodiment of the present disclosure;

[0026] FIG. 2 is a side view of a tangless helically coiled insert worked upon by the system of FIG. 1;

[0027] FIG. 3 is an end view of the tangless helically coiled insert;

[0028] FIG. 4 is top-down view of a vibrating bowl assembly of the system;

[0029] FIG. 5 is a partial cross section of the vibrating bowl assembly illustrating a shelf;

[0030] FIG. 6 is a top view of a track assembly of the system;

[0031] FIG. 7 is a side view of a shuttle of an insert separator device of the track assembly;

[0032] FIG. 8 is a side view of the track assembly;

[0033] FIG. 9 is a cross section of a track of the track assembly taken along line 9-9 of FIG. 8;

[0034] FIG. 10 is a cross section of a venturi structure of a vacuum delivery device of the system;

[0035] FIG. 11 is a cross section of an installation tool of the system;

[0036] FIG. 12 is a partial cross section of a tubular body of the installation tool taken from circle 12 of FIG. 11;

[0037] FIG. 13 is a cross section of the installation tool illustrating a mandrel in a staging position; and

[0038] FIG. 14 is a cross section of the installation tool similar to FIG. 13 except with the mandrel in a staged position.

DETAILED DESCRIPTION

[0039] Referring to FIG. 1, an installation system 20 adapted to install tangless helically coiled inserts is illustrated. The system 20 includes a bowl assembly 22 (i.e., hopper), a track assembly 24, a vacuum delivery device 26, and an installation tool 28. The installation system 20 is constructed to move tangless helically coiled inserts 34 (see FIGS. 2-3) in a downstream direction (see arrow 32) from the bowl assembly 22, to the track assembly 24, then to the vacuum delivery device 26, and into the installation tool 28. In one embodiment, the bowl assembly 22 is a vibrating bowl

assembly. In a non-limiting example, the vacuum delivery device **26** includes a flexible conduit that is under vacuum via a venturi effect to assist travel of the inserts **34** in the downstream direction **32**.

[0040] Referring to FIGS. **2** and **3**, the tangless helically coiled insert **34** is generally a wire that spirals around a center axis **36**. The insert **34** is generally cylindrical, and is adapted to contract radially when placed into a threaded, or taped, hole in a parent material or workpiece (not shown). The insert **34** includes an axial first end **38**, an opposite axial second end **40**, and a generally cylindrical outer surface **42** that spans axially between the ends **38**, **40**. The outer surface **42** has a diameter (see arrow **44**) when in an unbiased state (i.e., not contracted).

[0041] Referring to FIGS. **1**, **4**, and **5**, the bowl assembly **22** includes a bowl **46** having a concave internal face **48** that defines a containment **50** for the bulk storage of the tangless helically coiled inserts **34**. A helically coiled shelf **52** of the bowl assembly **22** laterally projects inward (i.e., into the containment **50**) from the internal face **48**. In operation and as the bowl **46** vibrates, the inserts **34** propagate upon the shelf **52** and move upward in a spiraling fashion and to an upstream end portion **54** of the track assembly **24** aligned to the shelf **52** for receipt of the inserts **34** in a single file and end **38** to end **40** (see FIG. **2**) orientation. That is, the inserts **34** are laying down upon the insert sides **42** is a single line formation. In one embodiment, the shelf **52** may include an upward projecting lip **56** at a distal edge to assist in maintaining the inserts **34** upon the shelf **52**. As illustrated in FIG. **4**, the track assembly **24** is tangentially aligned to the bowl **46**.

[0042] Referring to FIGS. **1**, and **6-9**, the track assembly **24** includes a track **58**, an insert holding device **60**, an insert separator device **62**, and an insert presence sensor **64**. The track **58** includes an elongated base **66** and opposing walls **68**, **70** projecting upward from the base **66**. The base **66** and walls **68**, **70** together define a channel **72** extending along a centerline **74**. The plurality of tangless helically coiled inserts **34** are received from the bowl assembly **22** at the upstream end portion **54** of the track **58** and into the channel **72** where the inserts travel along the centerline **74** in a single line and in an end-to-end fashion toward a downstream end portion **76** of the track **58**. In one example, the devices **60**, **62** may be pneumatically driven.

[0043] In one embodiment, the walls **68**, **70** of the track **58** define a plurality of air holes **78** spaced axially along the track **58** to assist in the travel of the inserts **34**. Each air hole **78** is angled toward the channel **72** in the downstream direction **32**. In one example, an angle (see arrow **80** in FIG. **6**) is measured at about forty-five degrees between each air hole **78** and the channel **72** from an upstream direction perspective. In operation, an air flow is directed through the holes **78** and into the channel **72** to push the inserts **34** in the downstream direction **32** and toward the downstream end portion **76** of the track **58**.

[0044] Referring to FIGS. **6** and **7**, the insert separator device **62** is mounted to the side wall **68** of the track **58** at the downstream end portion **76**. The separator device **62** functions as a type of “gateway,” and includes a shuttle **82**. The shuttle **82** is adapted to intersect and move in the channel **72** for controlled capture of an insert **34** as demanded via use of the installation tool **28**. The shuttle **82** defines a through-bore **84** centered about an axis **86** and sized for receipt of the leading insert **34** in the channel **72**. In operation and when the installation tool demands an insert **34**, the insert separator device **62** traverses the channel **72** until the bore axis **86** aligns with the channel axis **74**. Once the leading insert **34** enters the bore **84** as indicated by the presence sensor **64** (located immediately upstream of the shuttle **82** in the channel **72**), the insert separator device **62** actuates and moves the shuttle **82** until the bore axis **86** aligns with the centerline **88** of the vacuum delivery device **26**. It is therefore noted that the centerline **74** of the track **58** is offset from the centerline **88** of the vacuum delivery device **26**.

[0045] This offset is advantageous because it separates the track **58** from the vacuum delivery device **26**. That is, the vacuum delivery device **26** is under a vacuum condition to assist in the delivery of inserts **34**. The track **58**, itself, is not under a vacuum. If the offset and associated shuttle **82** did not exist, there would be nothing to stop the travel of the insert, thus no controlled

delivery of the insert **34**. In one embodiment, only one insert **34** is delivered through the vacuum delivery device **26** at a time. The shuttle **82** further assists in positioning the next insert **34** to be delivered, as the leading insert travels through the vacuum delivery device **26**.

[0046] Referring to FIG. **6** and in one example, the insert holding device **60** is mounted to the wall **70** of the track **58**, and is spaced upstream from the insert separator device **62** and the presence sensor **64**. The insert holding device **60** include a pin **89** adapted to transversely move into and out of the channel **72** for preventing travel of the inserts **34** along the channel **72**. In operation, and when the presence sensor **64** detects the presence of a leading insert **34** generally axially between the devices **60**, **62**, the insert holding device **60** will actuate and extend the pin **89** into the channel **72**, and thus contacting the side **42** of the insert **34** immediately upstream from the leading insert. With this contact, the insert **34** is biased against the opposing wall **68** of the track **58** preventing further travel.

[0047] Referring to FIGS. **1**, **8**, and **10**, the vacuum delivery device **26** includes a venturi structure **90** and a conduit **92** centered about the centerline **88**. The conduit extends along the centerline **88** between the installation tool **28** and the track assembly **24**. In one example, the conduit **92** is flexible enabling movement of the installation tool **28**.

[0048] In operation, and as best shown in FIG. **10**, compressed air enters the venturi structure **90** through an air supply port **91**, and exits through a series of circumferentially spaced orifices **93** into the main channel **95**. As compressed air exits the orifices **93**, the velocity of the air increases to supersonic speed. The air forced through the center of the tube rotates. This cyclonic flow creates a vacuum at the upstream end portion **97** of the venturi structure **90**. The vacuum created is strong enough to draw the inserts **34** from the shuttle **82** and through the venturi structure **90**.

[0049] Referring to FIGS. **1** and **11**, the insert installation tool **28** includes a nozzle body **94**, a mandrel **96**, a feed tube **98**, and an insert removal device **100**. The nozzle body **94** includes a tubular body **102** that defines a through-bore **104**, and a structure **106** that defines a chamber **108**. The through-bore **104** and the chamber **106** extend along a common insertion axis **110**, and are in axial communication with one-another. The mandrel **96** is adapted to rotate and axially reciprocate within the chamber **106** and the through-bore **104**. In one example, the nozzle body **94** with the tubular body **102** and the tubular structure **104** is one unitary piece. In one example, the structure **106** is tubular.

[0050] The tubular body **102** includes an internal surface **112** that defines the through-bore **104** and axially spans between opposite end portions **114**, **116** of the body. End portion **114** is attached to the structure **106** and the end portion **116** is a distal end portion. During operation, the direction of travel (i.e., downstream direction **32**) of the insert **34** is away from the end portion **114** and toward the end portion **116**.

[0051] Referring to FIGS. **11** and **12**, the internal surface **112** defines an insert entry port **118** proximate to the end portion **114** and an insert exit port **120** at the distal end portion **116**. Both ports **118**, **120** are in communication with the through-bore **104**. The exit port **120** is centered to the insertion axis **110**, and the entry port **118** is centered to the centerline **88** such that the centerline **88** intersects the insertion axis **110**. In one example, the end portion **114** includes the through-bore **104** having a bore diameter (see arrow **122**), and the distal end portion **116** includes the exit port **120** having a diameter (see arrow **124**) that is less than the bore diameter **122**. The diameter **44** of the insert **34** (see FIG. **2**) when in an unbiased state is less than the bore diameter **122** and greater than the exit port diameter **124**.

[0052] In one example, the distal end portion **116** of the tubular body **102** includes, or may be, a reduction nozzle **126** that defines the exit port **120**. The reduction nozzle **126** may include a portion of the internal surface **112** that is cylindrical. Downstream from the portion of the internal surface **112** that is cylindrical, the through-bore **104** may conform to a frustum shape (see bore portion **128**) as it diverges radially from the diameter **122** to the port diameter **120** in the downstream direction **32**. In one example the reduction nozzle **126** is separately attached to the distal end of the tubular

body **102**, and in another embodiment, the nozzle **126** is a unitary and integral part of the tubular body **102**.

[0053] The feed tube **98** is in communication with the entry port **118**, and projects outward therefrom along the centerline **88**. In one example, the feed tube **98** is rigid and is rigidly engaged to the nozzle body **96** and proximate to the end portion **114** of the tubular body **102**. To assist in the travel of the insert from the feed tube **98** and into the through-bore **104**, an obtuse angle (see arrow **130**) exists between the insertion axis **110** at the tubular body **102** and the centerline **88** at the feed tube **98**. In one example, the obtuse angle may be about one-hundred and fifty degrees (150 degrees).

[0054] Referring to FIGS. **11**, **13**, and **14**, the mandrel **96** includes a drive attachment end segment **132** and an opposite threaded end segment **134**. The mandrel **96** is adapted to reciprocate within the nozzle body **94** and rotate about the insertion axis **110**. In operation and when in a staging position **136** (see FIG. **13**), the threaded end segment **132** is axially displaced out of the tubular body **102** enabling receipt of the insert **34** through the insert entry port **118** and into the through-bore **104**. The insert **34** travels out of the feed tube **98** and is diverted into the through-bore **104** of the tubular body **102**. Once in the tubular body **102**, the insert **34** travels downward along the insertion axis **110** (e.g., by way of gravity) until the insert **34** (in its unbiased state) rests upon the end portion **116** generally at the frustum portion **128**.

[0055] With continued operation, the mandrel **96** is then inserted into the through-bore **104**. With this axial insertion, and rotation of the mandrel **96**, the mandrel enters a staged position **138**, the insert **34** is threaded upon the threaded end segment **134** as the insert **34** is biased against the internal surface **112** at the frustum portion **128** location (see FIG. **12**). With continued insertion, and as the insert is biased through the exit port **120**, the insert **34** radially contracts for accepts and threading into a tapped hole of a parent material or workpiece.

[0056] Referring to FIG. **11**, the insert removal device **100** of the installation tool **28** is engaged to the end portion **114** of the tubular body **102**, and is disposed axially proximate to the insert entry port **118**. The insert removal device **100** includes a block **140** constructed to extend into and out of the through-bore **104** to remove slipped tangless helically coiled inserts **34** from the threaded end segment **134** of the mandrel **96** when the threaded end segment **134** is axially aligned to the block **140**. In one example, the device **100** may be pneumatically actuated.

[0057] In operation, when the system **20** detects that an insert **34** has slipped, and thus has not unthreaded from the threaded end segment **134**, the block **140** is extended into the through-bore **104**, and contacts an end of the insert **34**. The mandrel **96** will then rotate in a reverse direction (e.g., counter-clockwise), thus unthreading the insert **34** from the threaded end segment **134**. Once unthreaded, the insert **34** is free to fall down the through-bore **104** and toward the exit port **120**.

[0058] Advantages and benefits regarding the installation system **20** include the automatic and continuous installation of tangless helically coiled inserts **34** from a bulk feeding mechanism. Other advantages include seamless installations by eliminating pitching errors and cross-threading, making the tool much less likely to seize when used on continuous automatic cycles.

[0059] While the present disclosure is described with reference to the figures, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the spirit and scope of the present disclosure. In addition, various modifications may be applied to adapt the teachings of the present disclosure to particular situations, applications, and/or materials, without departing from the essential scope thereof. The present disclosure is thus not limited to the particular examples disclosed herein, but includes all embodiments falling within the scope of the appended claims.

Claims

- 1.** An installation tool adapted to install tangless, helically coiled, inserts into a tapped hole, the installation tool comprising: a tubular body extending along an insertion axis, the tubular body including a first end portion and an opposite second end portion, wherein the tubular body includes an internal surface defining a through-bore centered to the insertion axis and communicating through the first and second end portions, and a direction of insert travel is from the first end portion and through the second end portion along the insertion axis; an insert exit port defined by the internal surface at the second end portion, centered about the insertion axis, and in communication with the through-bore, wherein the through-bore includes a bore diameter that is larger than a port diameter of the insert exit port; an insert entry port defined by the first end portion and in communication with the through-bore; and a mandrel including a drive attachment end segment and an opposite threaded end segment, the mandrel including a staging position wherein the threaded end segment is axially displaced out of the tubular body enabling receipt of the tangless helically coiled insert through the insert entry port and into the through-bore, and a staged position wherein the tangless helically coiled insert is threaded upon the threaded end segment and is radially contracted via biased contact against the internal surface at the insert exit port.
- 2.** The installation tool set forth in claim 1, wherein the internal surface converges radially inward from bore diameter and to the port diameter.
- 3.** The installation tool set forth in claim 1, further comprising: a tubular structure extending axially outward from the first end portion and defining a chamber extending along the insertion axis and in communication with the through-bore, wherein the threaded end segment is in the chamber when in the staging position.
- 4.** The installation tool set forth in claim 1, further comprising: a feed tube extending along a centerline and being in communication with and projecting upstream from the insert entry port.
- 5.** The installation tool set forth in claim 4, wherein an obtuse angle is measured between the insertion axis at the tubular body and the centerline.
- 6.** The installation tool set forth in claim 1, wherein the through-bore at the first end portion is cylindrical and has the bore diameter.
- 7.** The installation tool set forth in claim 6, wherein the second end portion includes a reduction nozzle defining in-part the through-bore and including the insert exit port, wherein the portion of the through-bore at the reduction nozzle is frustum shaped.
- 8.** The installation tool set forth in claim 1, wherein the bore diameter is greater than an external diameter of the tangless helically coiled insert when in an unbiased state, and the port diameter is less than the external diameter.
- 9.** The installation tool set forth in claim 3, further comprising: an insert removal device engaged to the first end portion and disposed axially proximate to the insert entry port, the insert removal device including a block constructed to extend into and out of the through-bore to remove slipped tangless helically coiled inserts from the threaded end segment when the threaded end segment is axially aligned to the block.
- 10.** The installation tool set forth in claim 9, wherein rotation of the mandrel when the block is extended causes contact of an end of the tangless helically coiled insert with the block and thus unthreading of the tangless helically coiled insert from the threaded end segment.
- 11.** An automated installation system for installing tangless helically coiled inserts, the automated installation system comprising: an installation tool including a nozzle body defining a through-bore extending along an insertion axis, and a mandrel adapted to reciprocate and rotate within the bore; a track defining a channel extending along a first centerline for the travel of a plurality of tangless helically coiled inserts disposed in the channel and to the installation tool; and an insert separator device mounted to the track and including a shuttle adapted to intersect and move in the channel, wherein the shuttle defines a through-bore having an axis aligned to the first centerline when in a

first position for acceptance of a tangless helically coiled insert from the channel, and aligned to a second centerline for expulsion of the tangless helically coiled insert from the track and into the installation tool, wherein the first centerline is offset from the second centerline and the second centerline intersects the insertion axis.

12. The automated installation system set forth in claim 11, further comprising: a feed tube extending along the second centerline, wherein the feed tube is disposed upstream from the installation tool and downstream from the track, and is in communication with the bore.

13. The automated installation system set forth in claim 12, wherein the nozzle body defines an insert entry port in communication with the bore and centered about the second centerline, and the feed tube is engaged to the nozzle body and is in communication with the insert entry port, and wherein an obtuse angle is measured between the insertion axis and the second centerline at the feed tube.

14. The automated installation system set forth in claim 12, further comprising: a vacuum delivery device including a conduit for the transport of the plurality of tangless helically coiled inserts along the second centerline from the track and into the feed tube.

15. The automated installation system set forth in claim 11, wherein the plurality of tangless helically coiled inserts are aligned end-to-end in the channel.

16. The automated installation system set forth in claim 11, further comprising: an insert holding device mounted to the track and spaced upstream from the insert separator device, the insert holding device including a pin adapted to transversely reciprocate into and out of the channel for blocking travel of the plurality of tangless helically coiled inserts in the channel.

17. The automated installation system set forth in claim 16, further comprising: an insert presence sensor mounted to the track and disposed between the insert separator device and the insert holding device, the sensor configured to detect the presence of a tangless helically coiled insert immediately upstream of the shuttle when the through-bore of the shuttle is axially aligned to the second centerline.

18. The automated installation system set forth in claim 11, further comprising: a vibrating bowl assembly located upstream from the track and including a bowl and a helically coiled shelf, the bowl including an internal face defining a containment for the storage of a plurality of tangless helically coiled inserts, and the helically coiled shelf projecting laterally inward from the internal face for the travel of the plurality of tangless helically coiled inserts in a single line formation and into the channel.

19. The automated installation system set forth in claim 11, wherein the track defines a plurality of air holes in communication with and axially spaced along the track to propel the plurality of tangless helically coiled inserts.

20. The automated installation system set forth in claim 19, wherein the plurality of air holes are each angled toward the channel in a downstream direction for the flow of air into the channel.
