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### Threaded tubular end protector

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#### Abstract

A thread protector that has an external sleeve to protect threads disposed on a tubular member. The thread protector includes a flange disposed on a first end of the external sleeve to be engageable with an end of the tubular member. The thread protector also includes a securing apparatus extending from the flange to frictionally engage an inner side of the tubular member to maintain the thread protector's engagement with the tubular member, the securing apparatus including a magnet that increases the force of the frictional engagement of the securing apparatus with the inner side of the tubular member. The securing apparatus can also extend from the flange to frictionally engage an inner side of the tubular member to maintain the thread protector's engagement with the tubular member, the securing apparatus rotatable relative to the external sleeve. A method of protecting pin threads of pin ends of tubular members by installing a thread protector on an end of a tubular member.

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## Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) The present application is a continuation application of U.S. Patent Application having U.S. Ser. No. 18/138,950, filed Apr. 25, 2023, which is a continuation application of U.S. Patent Application having U.S. Ser. No. 17/885,064, filed Aug. 10, 2022, which is a continuation-in-part application of U.S. Patent Application having U.S. Ser. No. 17/718,015, filed Apr. 11, 2022, which is a continuation-in-part application of U.S. Patent Application having U.S. Ser. No. 17/517,303, filed Nov. 2, 2021, which is a continuation-in-part application of U.S. Patent Application having U.S. Ser. No. 17/360,641, filed Jun. 28, 2021, which is a conversion of U.S. Provisional Application having U.S. Ser. No. 63/045,317, filed Jun. 29, 2020, which claims the benefit under 35 U.S.C. 119(e). The disclosure of which is hereby expressly incorporated herein by reference.

### STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

(1) Not applicable.

### BACKGROUND OF THE DISCLOSURE

#### 1. Field of the Disclosure

(2) The present disclosure relates to a thread protector for a threaded end of a unit of casing or tubing that can be quickly attached to and removed from the unit of casing or tubing. The present

disclosure also relates to a method of attaching or removing the thread protectors from the pin end of the units of casing or tubing.

## 2. Description of the Related Art

(3) Casing and/or tubing have a pin end and a box end. The box end includes threads inside, which are naturally protected by being disposed inside the tubing or casing. The pin end has threads on the outside of the tubing or casing that are exposed and can be damaged. Currently, there are protective devices for the pin end threads of the tubing or casing but they take a considerable amount of time to put on the tubing or casing and remove from the tubing or casing. When you multiply the time it takes to put on or remove a typical protector device from the pin end threads of multiple units of tubing or casing, it results in a large amount of time. This large amount of time is taken directly from production time of an oil or gas well.

(4) Accordingly, there is a need for a thread protector for the threads of the pin end of the tubing or casing that can be more quickly placed on and/or removed from the pin end of the tubing or casing, but still protects all the threads of the pin end of the tubing or casing.

## SUMMARY OF THE DISCLOSURE

(5) The present disclosure is directed toward a thread protector that has an external sleeve to protect threads disposed on a tubular member. The thread protector includes a flange disposed on a first end of the external sleeve to be engageable with an end of the tubular member. The thread protector also includes a securing apparatus extending from the flange to frictionally engage an inner side of the tubular member to maintain the thread protector's engagement with the tubular member, the securing apparatus including a magnet that increases the force of the frictional engagement of the securing apparatus with the inner side of the tubular member.

(6) The present disclosure is directed toward a thread protector that has an external sleeve to protect threads disposed on a tubular member. The thread protector includes a flange disposed on a first end of the external sleeve to be engageable with an end of the tubular member. The thread protector also includes a securing apparatus extending from the flange to frictionally engage an inner side of the tubular member to maintain the thread protector's engagement with the tubular member, the securing apparatus rotatable relative to the external sleeve.

(7) The present disclosure is also directed toward a method of protecting pin threads of pin ends of tubular members. The method includes installing a thread protector on an end of a tubular member.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. 1 is a cross-sectional view of a thread protector constructed in accordance with the present disclosure.

(2) FIG. 2 is a cross-sectional view of another embodiment of the thread protector constructed in accordance with the present disclosure.

(3) FIG. 3A is a cross-sectional view of yet another embodiment of the thread protector constructed in accordance with the present disclosure.

(4) FIG. 3B is a cross-sectional view of a further embodiment of the thread protector constructed in accordance with the present disclosure.

(5) FIG. 4 is a perspective view of a portion of another embodiment of a thread protector constructed in accordance with the present disclosure.

(6) FIG. 5 is a cross-sectional view of the thread protector shown in FIG. 4 and constructed in accordance with the present disclosure.

(7) FIG. 6 is a perspective view of a portion of yet another embodiment of a thread protector constructed in accordance with the present disclosure.

(8) FIG. 7A is a perspective view of a portion of yet another embodiment of a thread protector

constructed in accordance with the present disclosure.

(9) FIG. 7B is a perspective view of the embodiment of the thread protector shown in FIG. 7A constructed in accordance with the present disclosure.

(10) FIG. 8A is a perspective view of another embodiment of a thread protector constructed in accordance with the present disclosure.

(11) FIG. 8B is a cross-sectional view of the embodiment of the thread protector shown in FIG. 8A constructed in accordance with the present disclosure.

(12) FIG. 9A is a perspective view of a portion of yet another embodiment of a thread protector constructed in accordance with the present disclosure.

(13) FIG. 9B is a perspective view of the embodiment of the thread protector shown in FIG. 9A constructed in accordance with the present disclosure.

(14) FIG. 10A is a perspective view of another embodiment of a thread protector constructed in accordance with the present disclosure.

(15) FIG. 10B is a cross-sectional view of the embodiment of the thread protector shown in FIG. 10A constructed in accordance with the present disclosure.

(16) FIG. 10C is a cross-sectional view of a portion of the embodiment of the thread protector shown in FIG. 10A constructed in accordance with the present disclosure.

(17) FIG. 11A is a perspective view of another embodiment of a thread protector constructed in accordance with the present disclosure.

(18) FIG. 11B is an exploded view of the embodiment of the thread protector shown in FIG. 11A constructed in accordance with the present disclosure.

(19) FIGS. 12A-12C are additional views of the thread protector shown in FIGS. 11A and 11B constructed in accordance with the present disclosure.

(20) FIGS. 13A and 13B are perspective views of a portion of the thread protector shown in FIGS. 11A and 11B constructed in accordance with the present disclosure.

(21) FIGS. 14A and 14B are additional views of another portion of the thread protector shown in FIGS. 11A and 11B constructed in accordance with the present disclosure.

(22) FIGS. 15A-15D are views of thread protectors incorporating magnets.

(23) FIGS. 16A-16G are additional views of another portion of the thread protector shown in FIGS. 11A and 11B constructed in accordance with the present disclosure.

#### DETAILED DESCRIPTION OF THE DISCLOSURE

(24) The present disclosure is directed to a thread protector **10** to guard or protect threads **12** on a pin end **14** of a tubular member **16**. The tubular member **16** can be casing or tubing used in an oil and gas operation. The tubular member **16** also includes a box end **18** opposite the pin end **14**, an internal side **20** and an external side **22**. The box end **18** of the tubular member **16** includes internal threads **24** disposed therein on the internal side **20** of the tubular member **16**. The threads **12** disposed on the external side **22** of the pin end **18** of the tubular member **16** can be a certain number of threads or extend along a certain length of the tubular member **16**.

(25) The thread protector **10** includes an external sleeve **26** that is sized to fit around the external side **22** of the tubular member **16** and have a length that is at least as long as the length of the threads **12** disposed on the pin end **14** of the tubular member **14**. The external sleeve **26** can have an inner side **28**, an outer side **30**, a first end **32**, and a second end **34**. The inner side **28** of the external sleeve **26** can include at least one thread **36** to engage with the threads **12** disposed on the pin end **14** of the tubular member **16**.

(26) In one embodiment of the present disclosure, the thread protector **10** can also include a flange **38** inwardly directed in a radial direction from the first end **32** of the thread protector **10**. The flange **38** is positioned so that the pin end **14** of the tubular member **16** can engage the flange **38** to maintain the thread protector **10** in a protective position with respect to the threads **12** on the pin end **14** of the tubular member **16**. In another embodiment, an internal sleeve **40** can extend from an inner diameter **42** of the flange **38** in the same direction of the external sleeve **26** of the thread

protector **10**. The internal sleeve **40** is sized to extend back into the inside of the tubular member **16** to provide additional structural support for the thread protector **10**. In another embodiment, a plate **44** can be attached to the first end **32** of the external sleeve **26** instead of the flange **38** to prevent debris from getting inside the tubular member **16** when the tubular member **16** is not in use.

(27) The inner side **28** of the external sleeve **26** of the thread protector **10** can have any number of consecutive threads such that the thread protector **10** can be quickly removed and/or replaced from the tubular member **16**. The threads **12** disposed on the inner side **28** of the external sleeve **26** of the thread protector **10** are positioned close to the flange **38** of the thread protector **10** so that when the thread protector **10** engages with the threads **12** of the pin end **14**, the threads **12** of the thread protector **10** only engage with the threads **12** at the end of the pin end **14** of the tubular member **16**. If a limited number of the threads on the tubular member **16** are engaged to secure the thread protector **10** thereto, then the reduction in time it would take to remove the thread protector **10** from the tubular member **16**, and the time it would take to secure the thread protector **10** to the tubular member **16**, when combined for numerous tubular members, would be significant.

(28) In one embodiment, the number of threads **12** on the inner side **28** of the external sleeve **26** of the thread protector **10** can be less than ten threads. In another embodiment, the number of threads **12** on the inner side **28** of the external sleeve **26** of the thread protector **10** can be less than eight threads. In a further embodiment, the number of threads **12** on the inner side **28** of the external sleeve **26** of the thread protector **10** can be less than 6 threads. In yet another embodiment, the number of threads **12** on the inner side **28** of the external sleeve **26** of the thread protector **10** can be less than 4 threads. In another embodiment, the number of threads **12** on the inner side **28** of the external sleeve **26** of the thread protector **10** can be less than 3 threads. In a further embodiment, the number of threads **12** on the inner side **28** of the external sleeve **26** of the thread protector **10** can be less than 2 threads.

(29) The threads **12** on the pin end **14** of the tubular member **16** can extend along a certain length of the tubular member **16**. The engaged threads (threads extending from the end of the pin end of the tubular member that are engaged by the threads of the thread protector) extend a certain percentage of the length of all the threads **12** on the pin end **14** of the tubular member **16**. In one embodiment, the length of the engaged threads are less than about 40 percent of the total length of all the threads **12** on the pin end **14** of the tubular member **16**. In another embodiment, the length of the engaged threads are less than about 30 percent of the total length of all the threads **12** on the pin end **14** of the tubular member **16**. In a further embodiment, the length of the engaged threads are less than about 25 percent of the total length of all the threads **12** on the pin end **14** of the tubular member **16**. In yet another embodiment, the length of the engaged threads are less than about 20 percent of the total length of all the threads **12** on the pin end **14** of the tubular member **16**. In an even further embodiment, the length of the engaged threads are less than about 10 percent of the total length of all the threads **12** on the pin end **14** of the tubular member **16**. In another embodiment, the length of the engaged threads are less than about 5 percent of the total length of all the threads **12** on the pin end **14** of the tubular member **16**.

(30) Referring now to FIGS. 4-6, shown therein is a thread protector **10** that has a securing apparatus **46** that can extend inside the tubular member **16** from the flange **38**. The securing apparatus **46** can engage with the inside of the tubular member **16** to maintain position of the thread protector **10** relative to the threads **12** of the pin end **14** of the tubular member **16**. The securing apparatus **46** can have any size and shape such that it maintains the thread protector **10** in place on the tubular member **16**. In one embodiment, the securing apparatus **46** can include a plurality of fins **48** that extend from a central member **50**. The fins **48** have outer portions **52** that can engage with the inner side of the tubular member **16**. The fins **48** have terminal ends **54** on the opposite ends from the flange **38**. The outer portion **52** at the terminal ends **54** of the fins **48** can be tapered so that insertion of the securing apparatus **46** of the thread protector **10** is easier to extend down into the tubular member **16**. The length, width and height of the fins **48** can be varied such that the

thread protector **10** functions as intended. The securing apparatus **46** can also have any number of fins **48** such that the thread protector **10** functions as intended. In various embodiments, the securing apparatus **46** can have more than two fins **48**, more than three fins **48**, more than four fins **48** or five or more fins **48**.

(31) In another embodiment shown in more detail in FIG. **6**, the securing apparatus **46** can have a first spoke end **58** that is attached to the flange **38**, a second spoke end **60** that is separated from the first spoke end **58** via a rod member **62**. The first and second spoke ends **58** and **60** engage the inside of the tubular member **16** to hold the thread protector **10** securely in place. The first spoke end **58** can have any desired number of spokes **64** so that the thread protector **10** operates as intended. Similarly, the second spoke end **60** can have any desired number of spokes **66** so that the thread protector **10** operates as intended. A portion of the outer surfaces **68** of the spokes **66** can be tapered to facilitate insertion of the securing apparatus **46** into the tubular member **16**. The securing apparatus **46** can be used with or without the at least one thread **36** on the inner side **28** of the external sleeve **26** of the thread protector **10**. The spoke and fin designs of the securing apparatus **46** allow for visual inspection of the inner part of the tubular member **16** and cleaning of the inside part of the tubular member **16**.

(32) In yet another embodiment, the thread protector **10** can have a ridge or lip **70** disposed on an outer surface **72** of the external sleeve **26** close to a terminal end **74** of the external sleeve. The ridge **70** allows for engagement by a band that can extend to the tubular member **16** to help hold the thread protector **10** in position, such as during transportation of the tubular members **16** to and from job sites or while the tubular members **16** are being stored. The band that can be used can extend around the entire circumference of the thread protector **10** and the tubular member. Primarily, ridge **70** prevents the band from sliding off of the thread protector **10** and the band prevents the thread protector **10** from rotating off of the tubular member **16**.

(33) Referring now to FIGS. **7A** and **7B**, shown therein is another embodiment of a thread protector **10** that has a securing apparatus **46** that can extend inside the tubular member **16** from the flange **38**. The securing apparatus **46** can engage with the inside of the tubular member **16** to maintain position of the thread protector **10** relative to the threads **12** of the pin end **14** of the tubular member **16**. The securing apparatus **46** can have any size and shape such that it maintains the thread protector **10** in place on the tubular member **16**. In one embodiment, the securing apparatus **46** can include a plurality of bowed fingers **80** that extend from the flange **38**. The bowed fingers **80** are bowed outward towards the inner side **28** of the external sleeve **26** of the thread protector **10**.

(34) In another embodiment, the bowed fingers **80** can extend from the plate **44** that can be attached to the first end **32** of the external sleeve **26**. When the plate **44** is used, the plate **44** can have weakened sections **82** that permit removable parts **84** of the plate **44** to be removed if desired to expose the inside of the tubular member **16**. Terminal ends **86** of the bowed fingers **80** can have angled portions **90** that angle inwards away from the inner side **28** of the external sleeve **26** of the thread protector **10**. The angled portions **90** of the bowed fingers **80** allow the thread protector **10** to more easily permit the pin end **14** of the tubular member **16** to slide between the bowed fingers **80** and the external sleeve **26**. As the securing apparatus **46** is forced down into the tubular member, the bowed fingers **80** frictionally engage the inner side **28** of the tubular member **16**. The engagement of the bowed fingers **80** with the inner side **28** of the tubular member **16** causes the bowed fingers **80** to straighten, which permits more surface area of outer sides **92** of the bowed fingers **80** to contact the inner side **28** of the tubular member **16**.

(35) In a further embodiment of the present disclosure, the thread protector **10** can include a debris barrier **88** that is disposed around the inner side **28** of the external sleeve **26** of the thread protector **10** to prevent debris or fluid away from the threads **12** on the pin end **14** of the tubular member **16**. The debris barrier **88** can be disposed on the inner side **28** of the external sleeve **26** close to the terminal end **34** or immediately adjacent to the terminal end **34** of the external sleeve **26**. When the thread protector **10** is in use, the debris barrier **88** extends from the inner side **28** of the external

sleeve **26** of the thread protector **10** to the external side **22**, or very close to the external side **22**, of the tubular member **16**. The debris barrier **88** can be made of any material that prevents debris from passing between itself and the tubular member **16**. The debris barrier can be made of a polymeric material that is rigid, flexible or semi-flexible.

(36) The thread protector **10** can also include an opening **94** disposed in the external sleeve **26** for receiving a securing pin **96**. In one embodiment, the securing pin **96** can be tapered to permit a narrower end to be stuck through the opening **94** and contact the tubular member **16** to increase the secureness of the thread protector **10** on the tubular member **16**. When the tapered securing pin **96** is used, the size of the securing pin **96** is such that the securing pin **96** is securely lodged in the opening **94** when the securing pin **96** is securely positioned against the tubular member **16**. In another embodiment, the opening **94** and the securing pin **96** can be threaded wherein the securing pin **96** can be screwed into and through the opening **94** and securely against the tubular member **16** to further secure the thread protector **10** to the tubular member **16**. The securing pin **96** can be constructed of a material that is strong enough to engage the tubular member **16** and help secure the thread protector **10** to the tubular member **16**. However, if the securing pin **96** is going to engage the threads **12** on the tubular member **16**, the securing pin **96** can be constructed of a material that is softer than the material used to construct the tubular member **16**. Examples of material for the securing pin **96** include, but are not limited to, a polymeric material (i.e. plastic, rubber, nylon, etc.) and a soft metal.

(37) Referring now to FIGS. **8A** and **8B**, shown therein is another embodiment of a thread protector **10** that has a securing apparatus **46** that can extend inside the tubular member **16** from the flange **38**. In this embodiment, the securing apparatus **46** can include a plurality of bowed fingers **100** that extend from the flange **38** to an insertion ring **102**. The bowed fingers **100** are bowed outward towards the inner side **28** of the external sleeve **26** of the thread protector **10**. In another embodiment, the bowed fingers **100** can extend from the plate **44** that can be attached to the first end **32** of the external sleeve **26** and extend to the insertion ring **102**. When the plate **44** is used, the plate **44** can have weakened sections **104** that permit removable parts **106** of the plate **44** to be removed if desired to expose the inside of the tubular member **16**.

(38) The insertion ring **102** can have a tapered portion **108** that angle inwards away from the inner side **28** of the external sleeve **26** of the thread protector **10**. The tapered portion **108** can extend around the entire insertion ring **102**. The tapered portion **108** of the insertion ring **102** allows the thread protector **10** to more easily permit the pin end **14** of the tubular member **16** to slide between the insertion ring **102** (and the bowed fingers **100**) and the external sleeve **26**. As the securing apparatus **46** is forced down into the tubular member, the bowed fingers **100** frictionally engage the inner side **28** of the tubular member **16**. The engagement of the bowed fingers **100** with the inner side **28** of the tubular member **16** causes the bowed fingers **100** to straighten, which permits more surface area of outer sides **110** of the bowed fingers **100** to contact the inner side **20** of the tubular member **16**. In a further embodiment, the securing apparatus **46** can also include a structural ring that exists between the flange **38** or plate **44** and the bowed fingers **100** to provide additional structural support for the securing apparatus **46**.

(39) Referring now to FIGS. **9A** and **9B**, shown therein is another embodiment of a thread protector **10** that has a securing apparatus **46** that can extend inside the tubular member **16** from the flange **38**. In this embodiment, the securing apparatus **46** can include a plurality of U-shaped fingers **112** that have a first leg **114** that extends from the flange **38** and a second leg **116** that extends from a base portion **118** that also extends from flange **38**. The first leg **114** of each U-shaped finger **112** moves further from the internal side **20** of the tubular member **16** as the first leg **114** moves from the flange **38** to a bottom **120** of each U-shaped finger **112**. The base portion **118** of the securing apparatus **46** can have any shape desirable such that proper structural support is provided to the plurality of U-shaped fingers **112**. The base portion **118** can extend down into the tubular member **16**, or the base portion could be a plate that extends within the flange **38**.

(40) A pin end **14** of the tubular member **16** can be forced into the thread protector **10** such that a sidewall **122** of the tubular member **16** ends up being positioned between the external sleeve **26** of the thread protector **10** and each U-shaped finger **112**. The tapering relationship between the first leg **114** of each U-shaped finger **112** creates a situation where, depending on the thickness of the sidewall **122**, the sidewall **122** of the tubular member **16** gets securely wedged between the first leg **114** of each U-shaped finger **112**. The tapering relationship and the U-shape of each finger **112** creates a larger distance between the bottom **120** of each U-shaped finger **112** and the inner side **28** of the external sleeve **26**, which permits easier initial engagement with the tubular member **16**. As the pin end **14** of the tubular member **16** is forced into engagement with the securing apparatus **46** of the thread protector **10**, outer surfaces **124** of the first legs **114** of each U-shaped finger are flattened so that more surface area of the outer surfaces **124** can contact the internal side **20** of the tubular member **16** to better secure the thread protector **10** to the tubular member **16**.

(41) Referring now to FIGS. **10A-10C**, shown therein is a thread protector **10** that has a securing apparatus **46** that can extend inside the tubular member **16** from the flange **38** or the plate **44**. The securing apparatus **46** can engage with the inside of the tubular member **16** to maintain position of the thread protector **10** relative to the threads **12** of the pin end **14** of the tubular member **16**. In this embodiment, the securing apparatus **46** can include a plurality of fins **130** that extend radially from a central member **132**. The fins **130** have outer portions **134** that can engage with the inner side of the tubular member **16**. The length, width and height of the fins **130** can be varied such that the thread protector **10** functions as intended. The securing apparatus **46** can also have any number of fins **130** such that the thread protector **10** functions as intended. In one embodiment, the securing apparatus **46** can have multiple levels **136** of fins **130** wherein each level **136** of fins **130** can have varied lengths of fins **130**. Each fin **130** can also have a varied stiffness. The varied lengths of fins **130** at each level **136** provides engagement capabilities with tubular members **16** of varying sized inner diameters. For example, a wider tubular member **16** with a wider inner diameter would engage with the longer fins **130** of the securing apparatus **46** to secure the thread protector **10** on the tubular member **16**. Conversely, a tubular member **16** with a narrower inner diameter would engage with the shorter fins **130** of the securing apparatus **46** to secure the thread protector **10** on the tubular member **16**. The thread protector **10** can also include a handle **138** that can be attached in any manner known in the art for helping put on and remove the thread protector **10** on the tubular member **16**. In one embodiment, the handle **138** can be attached to the flange **38**.

(42) Referring now to FIGS. **11A-14B**, shown therein is another embodiment of a thread protector **10** that has a securing apparatus **46** that is selectively securable to the thread protector **10**. The securing apparatus **46** can extend inside the tubular member **16**. In this embodiment, the securing apparatus **46** can be removable from the thread protector **10** and exchanged with other sized securing apparatuses **46** so that the thread protector **10** can fit multiple size tubular members **16**. The securing apparatus **46** can include a plurality of U-shaped fingers **112** that have a first leg **114** that extends toward the flange **38** and a second leg **116** that extends from a base portion **118** of the securing apparatus **46**. The base portion **118** of the securing apparatus **46** can be secured to a base member **120** that is supported by the flange **38**. The first leg **114** of each U-shaped finger **112** moves further from the internal side **20** of the tubular member **16** as the first leg **114** moves from the direction of the flange **38** to a bottom **124** of each U-shaped finger **112**. The base member **120** that engages with the securing apparatus **46** can have any shape desirable such that proper structural support is provided to the plurality of U-shaped fingers **112** of the securing apparatus **46**. The base member **120** can extend down into the tubular member **16**, or the base member **120** could be a plate that extends within the flange **38**.

(43) Engagement between the base portion **118** of the securing apparatus **46** and the base member **120** can be designed such that the securing member **46** can be selectively engaged. This permits different sized securing apparatuses **46** can be used with the thread protector **10** depending on the size of the tubular member **16** having the threads to be protected. The base portion **118** of the



securing apparatus **46** can have protrusions **126** that extend therefrom that securely engage with openings **128** disposed in the base member **120**. It should be understood that the protrusions could be on the base member **120** and the openings could be disposed in the base portion **118** of the securing apparatus **46**. In one embodiment, the protrusions **126** can be L-shaped and the openings **128** can be sized such that the L-shaped protrusions can fit through. In one embodiment, the openings **128** can be slots that can permit a first leg **130** of the L-shaped protrusions **126** to pass there through and allow a second leg **132** (the portion that extends from the base portion **118** of the securing apparatus) to extend through the opening **128**. In one embodiment, at least one of the openings **128** has a flex member **134** extending laterally into the opening **128**. The flex member **134** allows the first leg **130** to pass through the opening **128** and permits the second leg **136** of the protrusion **126** to move past when the securing apparatus **46** is rotated relative to the base member **120** and the external sleeve **26** of the thread protector **10**, but the flex member **134** does not easily permit the rotation of the base member **120** of the securing apparatus **46** to be rotated back the other way. The external sleeve **26** of this embodiment can include a slit **136** disposed therein to provide a pry point to remove the thread protector **10** in certain situations.

(44) A pin end **14** of the tubular member **16** can be forced into the thread protector **10** such that a sidewall **138** of the tubular member **16** ends up being positioned between the external sleeve **26** of the thread protector **10** and each U-shaped finger **112**. The tapering relationship between the first leg **114** of each U-shaped finger **112** creates a situation where, depending on the thickness of the sidewall **138**, the sidewall **138** of the tubular member **16** gets securely wedged between the first leg **114** of each U-shaped finger **112**. The tapering relationship and the U-shape of each finger **112** creates a larger distance between the bottom **124** of each U-shaped finger **112** and the inner side **28** of the external sleeve **26**, which permits easier initial engagement with the tubular member **16**. As the pin end **14** of the tubular member **16** is forced into engagement with the securing apparatus **46** of the thread protector **10**, outer surfaces **140** of the first legs **114** of each U-shaped finger are flattened so that more surface area of the outer surfaces **140** can contact the internal side **20** of the tubular member **16** to better secure the thread protector **10** to the tubular member **16**.

(45) In yet another embodiment of the present disclosure, a debris sleeve **142** can be used with the thread protector **10** to create a thread protection system **144**. The debris sleeve **142** can be implemented to prevent moisture and debris from damaging the threads **12** of the tubular member **16**. The debris sleeve **142** is designed to cover a portion of the external sleeve **26** of the thread protector **10** and the external portion of the tubular member **16** adjacent to the external sleeve **26**. The debris sleeve **142** can have a wider portion **146** that covers the external sleeve **26** of the thread protector **10** and a narrower portion **148** that covers the external portion of the tubular member **16**. The wider portion **146** and the narrower portion **148** can each have a channel **150** disposed therein for receiving a band **152** (or strap) that can be tightened in the channels **150** to secure the engagement of the debris sleeve **142**. In one embodiment, the external sleeve **26** can include a circumferential channel **154** disposed therein for receiving the channel **150** disposed in the wider portion **146** of the debris sleeve **142**. The band **152** or strap can be any type of strap or band that can be tightened.

(46) The securing apparatus **46** can also include at least one magnet **160** disposed in any portion of the securing apparatus **46** so that the magnet **160** can be attracted to the inside of the tubular member **16** and help secure the thread protector **10** to the tubular member. Each securing apparatus can include any desired number of magnets **16** or desired magnet **160** sizes so that the thread protector **10** operates as desired. The magnet **160** can be imbedded in the surface or disposed on the surface of any part of the securing apparatus **46** shown in FIGS. 4-13B. FIG. 15A shows an exemplary embodiment of the magnet **160** incorporated into the thread protector **10** shown in FIGS. 7A and 7B. FIG. 15B shows an exemplary embodiment of the magnet **160** incorporated into the thread protector **10** shown in FIGS. 8A and 8B. FIG. 15C shows an exemplary embodiment of the magnet **160** incorporated into the thread protector **10** shown in FIGS. 9A and 9B. FIG. 15D

shows an exemplary embodiment of the magnet **160** incorporated into the thread protector **10** shown in FIGS. **11A-12C**. Some of the Examples show the magnets **160** embedded in parts of the securing apparatus **46** and others show the magnet **160** disposed on the surface of various parts of the securing apparatus **46**.

(47) Referring now to FIGS. **16A-16G**, shown therein is another embodiment of the thread protector **10** shown in FIGS. **11A-14B** having a unique engagement between the base portion **118** of the securing apparatus **46** and the base member **120**. In this embodiment, the base portion **118** of the securing apparatus **46** is rotatable relative to the base member **120**. Similar to the embodiment shown in FIGS. **13A-14B**, this permits different sized securing apparatuses **46** can be used with the thread protector **10** depending on the size of the tubular member **16** having the threads to be protected. The base portion **118** of the securing apparatus **46** can have protrusions **126** that extend therefrom that securely engage with a part of the base member **120**. It should be understood that the protrusions **126** could be on the base member **120** and the part the protrusions **126** engaged with could be disposed in/on the base portion **118** of the securing apparatus **46**. In one embodiment, the protrusions **126** can engage with an opening **162** disposed in the base member **120** to prevent axial separation of the base member **120** and the base portion **118**, but permit the base member **120** and the base portion **118** to rotate relative to each other.

(48) The opening **162** separates an inside part **164** of the base member **120** and an engagement side **166** that abuts an abutment side **168** of the base member **120**. A sidewall **170** defines the opening **162** and has a certain depth. Each protrusion **126** can include an engaging end **172** that selectively engages the inside part **164** of the base portion **118** to secure the base member **120** and the base portion **118** in an axial direction and a post portion **174** that extends from the abutment side of the base member to the engagement end **172** of each protrusion **126**. Each engagement end **172** can include a shoulder **176** that when the base member **120** and the base portion **118** are engaged, the shoulder **176** contacts the inside part **164** of the base member **120** and an angled portion **178** to permit the engagement ends **172** of be able to move up through the opening **162** and past the sidewall **170** when the base member **120** and the base portion **118** are connected. The post portion **174** is flexible which also allows the engagement end **172** of each protrusion to flex away from the sidewall **170** as the base member **120** and the base portion **118** are connected. The shoulders **176**, the abutment side **168** of the base portion **118** and the post portions **174** of the protrusions **126** create a circumferential slot that accepts the sidewall **170** that creates the opening **162** and provides that area where the base member **120** and the base portion **118** will be permitted to rotate relative to each other.

(49) The present disclosure is also directed toward a method of removing the thread protectors **10** from the tubular members **16** and using the tubular members **16** in various oil and gas operations. The method is also directed towards securing the thread protectors **10** to the tubular members **16** that are being used in the oil and gas operations.

(50) From the above description, it is clear that the present disclosure is well-adapted to carry out the objectives and to attain the advantages mentioned herein as well as those inherent in the disclosure. While present embodiments have been described herein, it will be understood that numerous changes may be made which will readily suggest themselves to those skilled in the art and which are accomplished within the spirit of the disclosure and claims. Any elements of any embodiments disclosed herein can be combined with any of the other embodiments disclosed herein.

## Claims

1. A thread protector, the thread protector comprising: an external sleeve to protect threads disposable on a tubular member; a sleeve to engage the external sleeve and an outside part of the tubular member to maintain position of the external sleeve adjacent to the threads; and a first strap

that is adjustable to engage the sleeve to secure it on the tubular member.

2. The thread protector of claim 1 further comprising a second strap that is adjustable to engage the sleeve to secure the sleeve to the external sleeve.
  3. The thread protector of claim 2 wherein the sleeve has a first portion that engages the tubular member and a second portion that engages the external sleeve.
  4. The thread protector of claim 3 wherein the external sleeve includes a channel around a circumference thereof disposed adjacent to a terminal end of the external sleeve and the second portion of the sleeve includes a recessed area that matingly engages the channel in the external sleeve, the recessed area in the second portion of the sleeve designed to receive the second strap.
  5. The thread protector of claim 4 wherein the first portion of the sleeve can have a channel around a circumference thereof that the first strap can engage to secure the sleeve to the tubular member and prevent the first strap from becoming engaged with the sleeve.
  6. A method of protecting threads of ends of tubular members, the method comprising: installing a thread protector on an end of a tubular member to protect threads disposed on end of the tubular member, the thread protector comprises: an external sleeve to protect threads disposable on a tubular member; a sleeve to engage the external sleeve and an outside part of the tubular member to maintain position of the external sleeve adjacent to the threads; and a first strap that is adjustable to engage the sleeve to secure it on the tubular member.
  7. The method of claim 6 further comprising a second strap that is adjustable to engage the sleeve to secure the sleeve to the external sleeve.
  8. The method of claim 7 wherein the sleeve has a first portion that engages the tubular member and a second portion that engages the external sleeve.
  9. The method of claim 8 wherein the external sleeve includes a channel around a circumference thereof disposed adjacent to a terminal end of the external sleeve and the second portion of the sleeve includes a recessed area that matingly engages the channel in the external sleeve, the recessed area in the second portion of the sleeve designed to receive the second strap.
  10. The method of claim 9 wherein the first portion of the sleeve can have a channel around a circumference thereof that the first strap can engage to secure the sleeve to the tubular member and prevent the first strap from becoming engaged with the sleeve.
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