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RAM GUIDE FOR A CRIMPER

Abstract

A crimping tool includes a crimping head, a ram movable along an axis relative to the crimping head between a retracted position and an extended position, a ram guide coupled to the crimping head, and a ram head. The ram head has a crimp surface, a base coupled to the ram, a lateral surface extending between the crimp surface and the base, and a channel formed in the lateral surface. The channel extends axially between the crimp surface and the base, receives the ram guide, and prevents the ram head from rotating relative to the crimping head.

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Background/Summary

RELATED APPLICATIONS [0001] This application claims priority to U.S. patent application Ser. No. 17/733,314, filed Apr. 29, 2022, and U.S. Provisional Patent Application No. 63/182,612 filed Apr. 30, 2021, each of which is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] Crimpers and cutters often include a crimping or cutting head and certain crimping and cutting features, depending on the particular configuration of the tool. Some crimpers and cutters are hydraulic power tools that include a piston that can exert force on the crimping head, which may be used to move crimping features to perform crimp or compression work at a targeted crimp location. Some crimpers include a ram head that can be advanced by a hydraulic ram along a ram guide of the crimping head.

SUMMARY

[0003] In some aspects, a crimping tool can include a crimping head, a ram movable along an axis relative to the crimping head between a retracted position and an extended position, a ram guide coupled to the crimping head, and a ram head. The ram head can have a crimp surface, a base coupled to the ram, a lateral surface extending between the crimp surface and the base, and a channel formed in the lateral surface and extending axially between the crimp surface and the base. The channel can receive the ram guide and prevent the ram head from rotating relative to the crimping head.

[0004] In some examples, the crimping head can include a crimping head base and a crimping portion, with the crimping head base defining a cavity that receives the ram.

[0005] In some examples, the ram head can be positioned in the cavity when the ram is in the retracted position and when the ram is in the extended position.

[0006] In some examples, the ram guide can be a rail that is coupled to the crimping head.

[0007] In some examples, the crimping head can define a slot and the ram guide can be removable from the slot.

[0008] In some examples, a depth of the ram guide in a radial direction can be greater than a depth of the slot in the radial direction.

[0009] In some examples, the base of the ram head can define a recess that receives the ram.

[0010] In some examples, the lateral surface can be cylindrical in shape.

[0011] In some examples, the crimp surface can extend between a first ledge and a second ledge that are opposite the base.

[0012] In some examples, the crimp surface can be a curved surface.

[0013] In some aspects, a head assembly for a hydraulic tool can include a base including a cavity defining an axis, a first guide coupled to the base, an arm extending from the base, and a head movable within the cavity and along the axis between a retracted position and an extended position. The head can include a second guide that engages the first guide and prevents rotation of the head relative to the base about the axis.

[0014] In some examples, the base can include a slot positioned in an internal surface of the cavity and the first guide can be positioned in the slot.

[0015] In some examples, the first guide can be retained in the slot with a fastener.

[0016] In some examples, the first guide can be received in the second guide.

[0017] In some examples, a first end of the head can define a first ledge and a second ledge in an opposed configuration, and a receiving surface between the first ledge and the second ledge.

[0018] In some examples, the second guide can be a channel that extends axially along an entire length of the head between the first end and a second end that is opposite the first end.

[0019] In some examples, the base can be a cylinder that receives a ram, the ram moving within the

cavity to cause the head to move between the retracted position and the extended position.
[0020] In some aspects, a power tool can include a cylinder having an inner surface defining a cavity, a ram positioned in the cavity and movable along an axis between a retracted position and an extended position, a first guide positioned in the cavity, and a ram head positioned in the cavity and movable with the ram between the retracted position and the extended position. The ram head can include a second guide that engages the first guide and prevents rotation of the ram head relative to the cylinder about the axis.
[0021] In some examples, the second guide can be a channel that extends along an entire length of the ram head between a first ledge and a base, and the first guide can be a rail that extends from the inner surface of the cylinder.
[0022] In some examples, a crimping portion can extend from the cylinder.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0023] The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of embodiments of the invention:
[0024] FIG. **1** is an isometric view of a crimping tool in a retracted position according to one embodiment of the invention.
[0025] FIG. **2** is an isometric view of a crimping head of the crimping tool of FIG. **1**.
[0026] FIG. **3** is a top isometric view of a ram head of the crimping tool of FIG. **1**.
[0027] FIG. **4** is a bottom isometric view of the ram head of FIG. **3**.
[0028] FIG. **5** is a cross-sectional isometric view of the crimping tool in an extended position, the cross section taken through line **5-5** of FIG. **1**.
[0029] FIG. **6** is a cross-sectional isometric view of the crimping tool in an extended position, the cross section taken through line **6-6** of FIG. **1**.
[0030] FIG. **7** is an isometric view of another crimping tool in a retracted position according to an embodiment of the invention.
[0031] FIG. **8** is a cross-sectional isometric view of a crimping head of the crimping tool of FIG. **7** taken through line **8-8**.
[0032] FIG. **9** is a top isometric view of a ram head of the crimping tool of FIG. **7**.
[0033] FIG. **10** is a bottom isometric view of the ram head of FIG. **9**.
[0034] FIG. **11** is a cross-sectional isometric view of the crimping tool in an extended position, the cross section taken through line **8-8** of FIG. **7**.
[0035] FIG. **12** is a cross-sectional isometric view of the crimping tool in the retracted position, the cross section taken through line **12-12** of FIG. **7**.
DETAILED DESCRIPTION
[0036] The following discussion is presented to enable a person skilled in the art to make and use embodiments of the invention. Various modifications to the illustrated embodiments will be readily apparent to those skilled in the art, and the generic principles herein can be applied to other embodiments and applications without departing from embodiments of the invention. Thus, embodiments of the invention are not intended to be limited to embodiments shown, but are to be accorded the widest scope consistent with the principles and features disclosed herein. The following detailed description is to be read with reference to the figures, in which like elements in different figures have like reference numerals. The figures, which are not necessarily to scale, depict selected embodiments and are not intended to limit the scope of embodiments of the invention. Skilled artisans will recognize the examples provided herein have many useful alternatives and fall within the scope of embodiments of the invention.

[0037] As used herein, unless specified or limited otherwise, the terms “mounted,” “connected,” “supported,” and “coupled” and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings. Further, “connected” and “coupled” are not restricted to physical or mechanical connections or couplings.
[0038] Unless otherwise specified or limited, the terms “about,” “approximately,” and “substantially” as used herein with respect to a reference vale refer to variations from the reference valve of ±5%, inclusive.
[0039] A ram guide for a crimping tool is described below. Some crimping tools include a crimping head and a ram head that can be used to create an indent or crimp on a work piece, such as a connector, for example. It can generally be useful to have a ram guide for the ram head to move along to align the crimp. The ram guide is configured to guide the ram head within a crimp portion of the crimping head to axially align the ram head with the crimping head and resist off center loading during a crimping action.
[0040] FIG. **1** illustrates a crimping tool **100** according to one embodiment of the invention. In some embodiments, the crimping tool **100** may be used with a hydraulic hand tool. As shown in FIG. **1**, the crimping tool **100** includes a crimping head **102** and a ram head **104**. The crimping head **102** is configured as a C-head and includes a base portion **108** and a crimp portion **110**. The ram head **104** is movable along a ram guide **112** between a retracted position, as illustrated in FIG. **1**, and an extended position (see, for example, FIG. **5**).
[0041] FIG. **2** illustrates the crimping head **102** of FIG. **1**. A hydraulic ram **116** extends within the crimping head **102** through the base portion **108** and into the crimp portion **110**. The hydraulic ram **116** is configured to be driven by a hydraulic actuation assembly (not shown) to advance and retract the ram head **104** within the crimp portion **110**. The hydraulic ram **116** includes a coupling end **118** to which the ram head **104** can be secured. The coupling end **118** extends at least partially into a work zone **120** (i.e., an area in which a work piece would be inserted into the crimping tool **100** to receive a crimp) of the crimping head **102**.
[0042] As also shown in FIG. **2**, the ram guide **112** includes a track **122** extending axially along a neck **124** of the crimp portion **110**. The track **122** faces the work zone **120** of the crimping head **102**. The track **122** protrudes radially inward (i.e., toward the work zone **120**) from the neck **124** to define a track height. The track **122** includes a first portion **130** and a second portion **132**, the first portion **130** being closer to the hydraulic ram **116** when the hydraulic ram **116** is in the retracted position. The first portion **130** defines a first width in a direction that is perpendicular to an axis of the base portion **108** of the crimping head **102** and the second portion **132** defines a second width in the direction that is perpendicular to the axis of the base portion **108**. In the illustrated embodiment, the first width is less than the second width so that the first portion **130** is narrower than the second portion **132**.
[0043] As further shown in FIG. **2**, the track **122** extends along a length of the neck **124** that faces the work zone **120**, and the first portion **130** terminates at a curved interface **134** of the neck **124** proximate the base portion **108** within the work zone **120**. The curved interface **134** can provide a smooth transition between the neck **124** and the base portion **108** within the work zone **120** so that the ram head **104** can be easily moved in and out of the work zone **120**. The track **122** also includes a curved transition **136** between the first portion **130** and the second portion **132**. Like the curved interface **134**, the curved transition **136** can provide a smooth transition between the first portion **130** and the second portion **132** as the ram head **104** moves along the track **122** from a retracted position to an extended position.
[0044] FIGS. **3** and **4** illustrate the ram head **104** of FIG. **1**. The ram head **104** includes a crimp surface **138** and a base **140** opposite the crimp surface **138**. Separate from the crimp surface **138** and the base **140** is a curved wall **142**. The curved wall **142** at least partially defines a geometry that is similar to a geometry of the crimp portion **110** of the crimping head **102** within the work zone **120** at the curved interface **134** between the neck **124** and the base portion **108**. For example,

the curved wall **142** can extend parallel to the portion of the base portion **108** of the crimping head **102** at the curved interface **134**. The curved wall **142** extends between a top portion **144** and a bottom portion **146**. The top portion **144** is disposed near the crimp surface **138** and the bottom portion **146** is disposed near the base **140**.

[0045] As also shown in FIGS. **3** and **4**, the curved wall **142** of the ram head **104** includes a slot **148** formed therein. The slot **148** extends between the top portion **144** and the bottom portion **146**. The slot **148** is generally formed as a T-slot or channel and includes a T-shaped end **150** at each of the top portion **144** and the bottom portion **146**. The slot **148** is at least partially defined by first and second legs **152** that extend generally into the slot **148** from the curved wall **142**. The slot **148** extends into the ram head **104** at the curved wall **142** to define a slot height. In some embodiments, the slot height corresponds to the height of the track **122** so that the track **122** can be received by the slot **148**, as will be described in further detail below with reference to FIG. **6**.

[0046] In some embodiments, the top portion **144** can further include a curved corner **145**. The curved corner **145** can facilitate inserting the ram head **104** into the crimping head **102**. For example, in use, the ram head **104** may be tipped so that the curved corner **145** engages crimping head **102** near the ram guide **112** first (i.e., before the rest of the ram head **104**). The ram head **104** can then be pivoted about the curved corner **145** so that the slot **148** can receive the lower portion **130** of the ram guide **112**. The curved corner **145** and allow a smooth rocking or pivoting motion of the ram head **104** so that the ram head **104** can quickly and smoothly secured to the crimping head **102**.

[0047] As shown in FIG. **3**, the crimp surface **138** is configured as a curved surface that extends between first and second ledges **156**. In use, a work piece may be inserted into the crimp portion **110** of the crimping head **102**, and the hydraulic ram **116** can move the ram head **104** from the retracted position to an extended position so that the crimp surface **138** engages the work piece and performs a crimp operation. As shown in FIG. **4**, the base **140** of the ram head **104** includes a recess **158** configured to be secured to the coupling end **118** of the hydraulic ram **116**. In some embodiments, the coupling end **118** of the hydraulic ram **116** can be bolted, pinned, press fitted, adhered, or otherwise secured to the base **140** of the ram head **104** at the recess **158**.

[0048] FIG. **5** illustrates a cross section of the crimping tool **100** in an extended position. Depending on the thickness of a work piece, the ram head **104** can extend within the crimp portion **110** of the crimping head **102** anywhere between the retracted position and a fully extended position (e.g., at least one of the first and second ledges **156** contacting a stop of the crimping head within the work zone **120**). In use, as the ram head **104** extends within the crimp portion **110**, the slot **148** is guided along the track **122**. The track **122** can help to align the ram head **104**, and generally align the crimping action on a work piece and resist off center loading. For example, the engagement of the slot **148** with the track **122** can help prevent or reduce movement of the ram head **104** laterally out of alignment within the crimp portion **110** of the crimping head **102**. In general, the track **122** can extend circumferentially within the slot **148** to prevent the ram head **104** from rotating relative to the crimping head **102**.

[0049] FIG. **6** illustrates a cross section of the crimping tool **100** and the engagement of the first and second legs **152** of the ram head **104** with the track **122** of the crimping head **102**. The track **122** is configured as a T-track that defines a T-shaped profile. The track **122** includes first and second undercuts **162** formed by the T-shaped profile along the second portion **132** of the track **122**. Each of the first and second legs **152** of the ram head **104** extend into respective first and second undercuts **162** to secure the ram head **104** relative to the crimping head **102**. The track **122** is dimensioned to generally fully occupy (e.g., at least 90%) the opening formed by the slot **148** of the ram head **104** in a lateral direction (i.e., the x-direction) when the ram head **104** is positioned along the second portion **132** of the track **122**. In contrast, when the ram head **104** is positioned along the first portion **130** of the track **122** (e.g., in a fully-retracted position), the first and second legs **152** are free to disengage (i.e., in the y-direction) from the track **122** to remove the ram head

104 from the ram guide **112**.
[0050] In use, the ram head **104** moves from a retracted position to an extended position in the z-direction. As the ram head **104** extends, the crimp surface **138** can engage a work piece. As the crimp surface **138** engages the workpiece, forces in a variety of directions may be imparted on the ram head **104**. A counterforce provided by the hydraulic ram can prevent the ram head **104** from moving in the z-direction toward a retracted position. A counterforce provided by the engagement of the legs **152** of the ram head **104** with the track **122** of the crimping head **102** can prevent the ram head **104** from moving laterally in the x-direction and radially in the y-direction. Such counterforces allow the ram head **104** to provide a straight (e.g., square) crimp on the work piece. Providing a square crimp can be useful to reduce uneven wear on the crimping tool **100** and to produce a reliable crimp on the work piece.
[0051] As described above with respect to FIG. **2**, the track **122** can include the curved transition **136** between the narrowed first portion **130** and the wider second portion **132**. Like the curved interface **134**, the curved transition **136** can advantageously provide a smooth transition between the first portion **130** and the second portion **132** as the ram head **104** moves along the track **122** in the z-direction. The smooth transition allows the hydraulic ram **116** to provide a constant extending force to the ram head **104** without the ram head catching or otherwise getting hung up on the transition from the narrow part of the track **122** to the wider part of the track **122**. The constant extending force can be useful to prevent overworking or unequal power draw from the power source of the hydraulic ram **116**. Similar advantages can apply to the curved interface **134**.
[0052] FIG. **7** illustrates a crimping tool **200** according to another embodiment of the invention. Similar to the crimping tool **100**, the crimping tool **200** may be used with a hydraulic hand tool. As shown in FIG. **7**, the crimping tool **200** includes a crimping head **202** and a ram head **204**. The crimping head **202** is configured as a C-head and includes a base portion **208** and a crimp portion **210**. The ram head **204** is movable within the crimp portion **210** along a ram guide **212** between a retracted position and an extended position. In the illustrated embodiment, the ram guide **212** includes a rail **216** configured as a track that extends along a slot **218** formed in an internal surface of the base portion **208** of the crimping head **202**. The base portion **208** forms a cavity within the crimping tool **200**, which is separate from the crimping zone and closed at one axial end by the ram head **204**.
[0053] FIG. **8** illustrates the crimping head **202** of FIG. **7**. The slot **218** extends axially along the base portion **208** along a side wall and defines a slot depth. In the illustrated embodiment, the slot **218** extends internally along the base portion **208** from the crimp portion **210** to a first contour **222** of the base portion **208**, however, other configurations are possible. The slot **218** is configured to receive the rail **216** of the ram head **204**. The rail **216** defines a radial width. The radial width of the rail **216** is greater than the slot depth so that the rail **216** extends radially inward into the internal volume of the base portion **208** from the slot **218**. The rail **216** can be bolted, pinned, adhered, press fitted, or otherwise secured within the slot **218**. In some embodiments, the rail **216** may be secured axially within the slot **218** via a bolt that extends through an opening formed in an outer surface of the base portion **208** of the crimping head **202**.
[0054] In some embodiments, the rail **216** may be removable, selectively fixable, and thus, replaceable. In some instances, the rail **216** may be replaced as part of maintenance or to accommodate a variety of ram heads. For example, different ram heads may have different geometries and require an appropriate corresponding rail. In particular, different ram heads may include different depths of channels (see, for example, the channel **248** of the ram head **204** of FIGS. **9** and **10**), and thus require a rail having a particular thickness in the radial direction, which may be inserted and coupled to the crimping head **202**.
[0055] In use, to secure the rail **216** to the crimping head **202**, the rail **216** may be inserted into the slot **218** until an axial end of the rail **216** abuts the contour **222** of the base portion **208**. The contour **222** of the base portion **208** can be configured as an annular interior ledge that prevents the

rail **216** from over-extending into the base portion **208**. The contour **222** can provide a stop for both the rail **216** and a bottom portion of the ram head body **204**. The contour **222** can be integrally formed with the base portion **208** at a set distance below the work zone. Since the rail **216** may be replaced within the crimping head **202**, a variety of lengths of rails may be used to accommodate a variety of ram heads.

[0056] As also shown in FIG. **8**, the base portion **208** is configured as a hollow cylinder. The base portion **208** can house a hydraulic ram **226** (see, for example, FIG. **11**). The hydraulic ram **226** can be configured to be driven by a hydraulic actuation assembly (not shown) to advance and retract the ram head **204** within the crimp portion **210**. The base portion **208** is also dimensioned to receive at least a portion of the ram head **204**. In particular, when the ram head **204** is in the retracted position, a majority of the ram head **204** may be received by the base portion **208** of the crimping head **202**.

[0057] FIGS. **9** and **10** illustrate the ram head **204** of FIG. **7**. The ram head **204** includes a crimp surface **238** and a base **240** opposite the crimp surface **238**. An outer wall **242**, configured as a curved lateral surface, extends between the crimp surface **238** and the base **240**. The outer wall **242** includes a channel **248** formed therein. The channel **248** defines a channel depth in a radial direction. The channel depth may be less than the radial width of the rail **216**. For example, the channel depth may be approximately (e.g., within 90%) of the difference between the radial width of the rail **216** and the slot depth of the slot **218** formed in the base portion **208** of the crimping head **202** so that the outer wall **242** is generally flush with an inner wall of the base portion **208** (see, for example, FIG. **12**). In some embodiments, the outer wall **242** can be substantially parallel to the inner wall of the cavity defined by the base portion **208**.

[0058] As shown in FIG. **9**, the crimp surface **238** is configured as a curved surface that extends between first and second ledges **256**. In use, a work piece may be inserted into the crimp portion **210** of the crimping head **202** and the hydraulic ram **226** can move the ram head **204** from the retracted position to an extended position so that the crimp surface **238** engages the work piece and performs a crimp operation. As shown in FIG. **10**, the base **240** of the ram head **204** includes a recess **258** configured to engage a coupling end of the hydraulic ram **226**.

[0059] FIG. **11** illustrates a cross section of the crimping tool **200** in an extended position. Depending on the thickness of a work piece, the ram head **204** can extend within the crimp portion **210** of the crimping head **202** anywhere between the retracted position and a fully extended position. In use, as the ram head **204** extends within the crimp portion **210**, the channel **248** is guided along the rail **216**. In some extended positions, a portion of the channel **248** may be disengaged from (i.e., not in contact with) the rail **216**. The ram guide **212** (i.e., the rail **216** and the channel **248**) can align the ram head **204**, and generally align the crimping action on a work piece and advantageously resist off center loading. For example, the engagement of the rail **216** with the channel **248** can help reduce or prevent movement of the ram head **204** radially out of alignment with the crimp portion **110** of the crimping head **102** and promote axial alignment of the ram head **204** with the crimping head **202**.

[0060] As shown in FIGS. **9** and **10**, the outer wall **242** defines a body height of the ram head **204** in an axial direction. As shown in FIG. **11**, the body height of the ram head **204** is greater than an axial height of a portion of a work zone **262** defined by the crimp portion **210** of the crimping head **202**. In particular, the body height of the ram head **204** allows the channel **248** to remain engaged with the rail **216** while the ram head **204** is in the retracted position, the fully extended position, and any intermediate positions between the retracted and fully extended position. Additionally, in the illustrated embodiment, the height of the ram head **204** allows a portion of the ram head **204** to remain within the cavity of the base portion **208**, even in the fully extended position.

[0061] FIG. **12** illustrates a cross section of the crimping tool **200** and the engagement of the rail **216** with each of the slot **218** and the channel **248**. The rail **216** is dimensioned to generally occupy (e.g., at least 90%) of each of the slot **218** formed in the crimping head **202** and the channel **248**

formed in the ram head **204** in a lateral direction (i.e., the x-direction).
[0062] In use, the crimping head can move from a retracted position to an extended position (and vice versa) by travelling along the z-direction. The engagement of the rail **216** within the channel **248** of the ram head **204** prevents movement of the ram head x-direction (with respect to FIG. **12**) and generally promotes concentric alignment with the base **208** of the crimping head **202**. As shown, the rail **216** is disposed opposite the neck of the crimping head **202** from the ram head **204**. This orientation of the rail **216** relative to the neck can reduce any bending moment or pivot point formed at the engagement of the ram head **204** and the ram guide **212**. For example, if a ram guide were formed on the same side of a ram head as a neck of the crimping head, the ram head may be allowed to pivot about an axis extending in the z-direction and out of alignment with the crimping head. Thus, it is generally advantageous to separate the rail **216** approximately 180 degrees about the z-axis from the neck of the crimping head **202** to maintain concentric alignment and reduce misalignment in the x and y-directions during a crimping action.
[0063] It is to be understood that the disclosure is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The disclosure is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including,” “comprising,” or “having” and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Unless specified or limited otherwise, the terms “mounted,” “connected,” “supported,” and “coupled” and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings. Further, “connected” and “coupled” are not restricted to physical or mechanical connections or couplings.
[0064] As used herein, unless otherwise limited or defined, discussion of particular directions is provided by example only, with regard to particular embodiments or relevant illustrations. For example, discussion of “top,” “front,” or “back” features is generally intended as a description only of the orientation of such features relative to a reference frame of a particular example or illustration. Correspondingly, for example, a “top” feature may sometimes be disposed below a “bottom” feature (and so on), in some arrangements or embodiments. Further, references to particular rotational or other movements (e.g., counterclockwise rotation) is generally intended as a description only of movement relative a reference frame of a particular example of illustration.
[0065] In some implementations, devices or systems disclosed herein can be utilized or installed using methods embodying aspects of the disclosure. Correspondingly, description herein of particular features, capabilities, or intended purposes of a device or system is generally intended to inherently include disclosure of a method of using such features for the intended purposes, a method of implementing such capabilities, and a method of installing disclosed (or otherwise known) components to support these purposes or capabilities. Similarly, unless otherwise indicated or limited, discussion herein of any method of manufacturing or using a particular device or system, including installing the device or system, is intended to inherently include disclosure, as embodiments of the disclosure, of the utilized features and implemented capabilities of such device or system.
[0066] As used herein, unless otherwise defined or limited, ordinal numbers are used herein for convenience of reference based generally on the order in which particular components are presented for the relevant part of the disclosure. In this regard, for example, designations such as “first,” “second,” etc., generally indicate only the order in which the relevant component is introduced for discussion and generally do not indicate or require a particular spatial arrangement, functional or structural primacy or order.
[0067] As used herein, unless otherwise defined or limited, directional terms are used for convenience of reference for discussion of particular figures or examples. For example, references

to downward (or other) directions or top (or other) positions may be used to discuss aspects of a particular example or figure, but do not necessarily require similar orientation or geometry in all installations or configurations.
[0068] This discussion is presented to enable a person skilled in the art to make and use embodiments of the disclosure. Various modifications to the illustrated examples will be readily apparent to those skilled in the art, and the generic principles herein can be applied to other examples and applications without departing from the principles disclosed herein. Thus, embodiments of the disclosure are not intended to be limited to embodiments shown, but are to be accorded the widest scope consistent with the principles and features disclosed herein and the claims below. The following detailed description is to be read with reference to the figures, in which like elements in different figures have like reference numerals. The figures, which are not necessarily to scale, depict selected examples and are not intended to limit the scope of the disclosure. Skilled artisans will recognize the examples provided herein have many useful alternatives and fall within the scope of the disclosure.
[0069] Also as used herein, unless otherwise limited or defined, “or” indicates a non-exclusive list of components or operations that can be present in any variety of combinations, rather than an exclusive list of components that can be present only as alternatives to each other. For example, a list of “A, B, or C” indicates options of: A; B; C; A and B; A and C; B and C; and A, B, and C. Correspondingly, the term “or” as used herein is intended to indicate exclusive alternatives only when preceded by terms of exclusivity, such as “either,” “one of,” “only one of,” or “exactly one of.” Further, a list preceded by “one or more” (and variations thereon) and including “or” to separate listed elements indicates options of one or more of any or all of the listed elements. For example, the phrases “one or more of A, B, or C” and “at least one of A, B, or C” indicate options of: one or more A; one or more B; one or more C; one or more A and one or more B; one or more B and one or more C; one or more A and one or more C; and one or more of each of A, B, and C. Similarly, a list preceded by “a plurality of” (and variations thereon) and including “or” to separate listed elements indicates options of multiple instances of any or all of the listed elements. For example, the phrases “a plurality of A, B, or C” and “two or more of A, B, or C” indicate options of: A and B; B and C; A and C; and A, B, and C. In general, the term “or” as used herein only indicates exclusive alternatives (e.g. “one or the other but not both”) when preceded by terms of exclusivity, such as “either,” “one of,” “only one of,” or “exactly one of.”
[0070] Various features and advantages of the disclosure are set forth in the following claims.

Claims

1. A crimping tool comprising: a crimping head; a ram movable along an axis relative to the crimping head between a retracted position and an extended positioned; a ram guide coupled to the crimping head; and a ram head having: a crimp surface, a base coupled to the ram, a lateral surface extending between the crimp surface and the base, and a channel formed in the lateral surface and extending axially between the crimp surface and the base, the channel receiving the ram guide and preventing the ram head from rotating relative to the crimping head.
2. The crimping tool of claim 1, wherein the crimping head includes a crimping head base and a crimping portion, the crimping head base defining a cavity that receives the ram.
3. The crimping tool of claim 2, wherein the ram head is positioned in the cavity when the ram is in the retracted position and when the ram is in the extended position.
4. The crimping tool of claim 1, wherein the ram guide is a rail that is coupled to the crimping head.
5. The crimping tool of claim 4, wherein the crimping head defines a slot and the ram guide is removable from the slot.
6. The crimping tool of claim 5, wherein a depth of the ram guide in a radial direction is greater

than a depth of the slot in the radial direction.
7. The crimping tool of claim 1, wherein the base of the ram head defines a recess that receives the ram.
8. The crimping head of claim 1, wherein the lateral surface is cylindrical in shape.
9. The crimping head of claim 1, wherein the crimp surface extends between a first ledge and a second ledge that are opposite the base.
10. The crimping head of claim 1, wherein the crimp surface is a curved surface.
11. A head assembly for a hydraulic tool, the head assembly comprising: a base including a cavity defining an axis; a first guide coupled to the base; an arm extending from the base; and a head movable within the cavity and along the axis between a retracted position and an extended position, the head including second guide that engages the first guide and prevents rotation of the head relative to the base about the axis.
12. The head assembly of claim 11, wherein base includes a slot positioned in an internal surface of the cavity and the first guide is positioned in the slot.
13. The head assembly of claim 12, wherein the first guide is retained in the slot with a fastener.
14. The head assembly of claim 11, wherein the first guide is received in the second guide.
15. The head assembly of claim 11, wherein a first end of the head defines a first ledge and a second ledge in an opposed configuration, and a receiving surface between the first ledge and the second ledge.
16. The head assembly of claim 15, wherein the second guide is a channel that extends axially along an entire length of the head between the first end and a second end that is opposite the first end.
17. The head assembly of claim 11, wherein the base is a cylinder that receives a ram, the ram moving within the cavity to cause the head to move between the retracted position and the extended position.
18. A power tool comprising: a cylinder having an inner surface defining a cavity; a ram positioned in the cavity and movable along an axis between a retracted position and an extended positioned; a first guide positioned in the cavity; and a ram head positioned in the cavity and movable with the ram between the retracted position and the extended position, the ram head including a second guide that engages the first guide and prevents rotation of the ram head relative to the cylinder about the axis.
19. The power tool of claim 18, wherein the second guide is a channel that extends along an entire length of the ram head between a first ledge and a base, and wherein the first guide is a rail that extends from the inner surface of the cylinder.
20. The power tool of claim 18, wherein a crimping portion extends from the cylinder.