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Hose clamp pliers

Abstract

A hose clamp pliers for use with both a wire spring hose clamp and a band spring hose clamp is disclosed. Two arms of the hose clamp pliers each rotatably carry contact points of different configurations. The first contact point is designed to receive, in a first position, an end portion of a wire spring clamp through a notch; and in a second position, to receive a hoop-shaped end of a band spring clamp. The second contact point is configured to receive both an end portion of a wire spring clamp, and a tab-shaped end of a band spring clamp. The hose clamp pliers is provided with a thumb release cooperating with a ratcheting pawl to control opening and closing of the pliers arms, which opens and closes the hose clamp.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

(1) This patent application is related to U.S. patent application Ser. Nos. 18/299,548, 18/299,559, 29/873,994, 29/873,996, and 29/873,997, all filed Apr. 12, 2023.

BACKGROUND OF THE INVENTION

(2) The present invention relates to pliers, and more particularly, to hose clamp pliers designed for effortless and secure clamping and unclamping of hoses and other similar objects. Hose clamp pliers are a specialized type of pliers used for tightening or loosening hose clamps.

(3) Hose clamps are well known in the art, and are used to attach and seal hoses to fittings such as pipes or tubes. Hose clamps are commonly used to secure hoses onto fittings or other objects, preventing leakage or detachment. Hose clamps can be loosened to allow removal or placement of the hose around its fitting, and then repositioned about the fitting and tightened to keep the hose in place around the fitting.

(4) There are several different styles of hose clamps, including worm gear, t-bolt, ear, single and double wire, quick-release, and spring clamps. Spring clamps are preferred in automotive applications because they adapt to fluctuating temperatures within engine compartments which subject the hoses (and by extension, the hose clamps constraining those hoses) to expansion and contraction due to the fluctuating temperatures. The present invention relates to two commonly used styles of spring style hose clamps used in automotive applications: wire spring clamps and band spring clamps. Both of these styles are provide compressive leak-free seals because they are self-tensioning, as the resilient force of the metal which forms these styles of clamps urges and biases the hose clamp shut.

(5) Wire spring clamps (also known as Corbin clamps) typically comprise heavy-gauge metal wire strap, circular in cross-section, which is formed into a circular shape. The two ends of the wire spring clamp overlap, and the resilient force of the metal urges and biases the hose clamp shut. The

two ends of the wire spring clamp are pointed radially outwardly. When installing, removing, or repositioning a hose about its respective fitting, the ends of the wire spring clamp can be compressed towards one another to loosen the spring clamp. The ends are then released to re-tension the wire spring clamp about the hose.

(6) A band spring clamp is a type of hose clamp that consists of a metal band or strap, typically made of a flat length of metal. Like the wire spring clamps, band spring clamps are formed into a circular shape with overlapping ends. A first end of the band spring clamp is nested within a void space provided towards a second end of the band style spring hose clamp. The result is that the two ends of the band spring clamp are of different shapes and sizes—at one end a smaller tab-shape, and at the other end, a larger hoop-shape. Also like the wire clamp, when installing, removing, or repositioning the band clamp, the two ends can be compressed towards one another to loosen the band clamp. The ends are then released to re-tension the band clamp about the hose.

(7) Hose clamp pliers are designed to work with different types of spring hose clamps, and are often used in automotive, plumbing, and industrial applications. The pliers engage both ends of the spring hose clamps, and can be used to urge the ends of the hose clamp together to loosen the ends of the clamp together to loosen the clamp, and then released to allow the ends of the clamp to separate and allow the automatic self-tensioning of the clamp. Prior art hose clamp pliers are provided with a ratcheting mechanism that allows the user to lock the clamp in place at various stages of tightening or loosening, and the ratcheting mechanism can be disengaged so the jaws can work freely.

(8) Different types of hose clamp pliers are used. Flathead plier heads are simple, flat blade pliers that are designed to fit over the tabs on the spring clamp and squeeze them together. Cable head pliers have a long, flexible cable instead of a rigid jaw, and the cable holds contact points to engage the spring clamp. This allows users to reach hose clamps in awkward locations and adjust the angle of the head as needed. Swivel head pliers have a head that can rotate 360 degrees. This allows users to access hose clamps from different angles, or to adjust the tool handles in relation to the hose clamp.

(9) Prior art hose clamp pliers for wire spring clamps can be provided with two like contact points for engaging the circular in cross-section wire ends of the wire spring clamps. One design for this type contact point is a cup with a slot or groove formed at top portion of the cup.

(10) Prior art hose clamp pliers for band spring clamps can also be provided with two different style contact points, with one style contact point designed to engage the smaller single tab-shape end of the band spring clamp (for example a contact point with a cup with or without a slot or groove formed at top portion of the cup, similar to a contact point for hose clamp pliers for a wire spring clamp), and the other style designed to engaged the larger hoop-shaped end of the band spring clamp (for example a fork-style contact point). One example of this contact point arrangement is shown in U.S. Pat. No. 6,128,975.

SUMMARY OF THE INVENTION

(11) The present invention provides a hose clamp pliers that is specifically designed for effortless and secure clamping of hoses and other similar objects. The pliers comprise a pair of handles pivotally connected, and contact points positioned at a distal end of the tool. The contact points or jaws are configured to engage different end styles, including both spring style hose clamps and band spring clamps. In a first position, a single male contact point can effectively secure a radially outwardly directed cylindrical end of a wire spring clamp; and in a second position, the same male contact point can also effectively secure a hoop-shaped end of a band spring clamp. A single female contact point can effectively secure radially outwardly directed cylindrical ends of a wire spring clamp of different dimensions. The same single female contact point can also effectively secure the smaller tab-shape of a band spring clamp. In this manner the contact points of the present invention can engage both a band spring clamp and a spring style hose clamp without needing to change tools or change contact points.

(12) The pliers also feature an engagement mechanism that keeps the jaws in a predetermined position resisting opening, allowing for hands-free operation once the contact points have been engaged with the spring clamp ends. The engagement mechanism comprises a lever or button that can be easily activated to restrain the jaws from opening. Moreover, the pliers can be designed to have a spring-loaded mechanism that allows for quick and easy opening of the jaws, facilitating efficient and time-saving clamping. In a thumb release disengaged position, the jaws are free to rotate or swing back and forth manually, or remain biased in a full open position in which a spring urges maximum separation of the jaws. Opening of the jaws is limited in the thumb release disengaged position by rotation one of the plier arms carrying a ratcheting pawl, which introduces a jaw stop contact surface of the ratcheting pawl against a handle jaw stop shoulder on the opposing plier arm, thereby limiting further opening of the jaws. In a thumb release engaged position, a ratcheting mechanism is engaged to tighten and keep the jaws in the predetermined position, or enabling tightening of the contact points and therefore the spring clamp end points to loosen the spring clamp about the hose.
(13) Pliers typically comprise five portions: two handles, a pivot point, and two jaws or contact points carried by arms that extend from the pivot point. The right handle operates the left jaw about the pivot point, and the left handle operates the right jaw about the pivot point. Hose clamp pliers of the prior art have separate arms and handles. The present invention provides for a single piece blank which forms both the handles (preferably carrying grips) and the arms (carrying the unique contact points of at least one design of the present invention). The single piece blank and handle configuration can be repeated and identical for both right and left sides, thereby reducing manufacturing costs and complexity.
(14) In a preferred embodiment, the contact points are independently rotatable which allows for articulation of the tool about the hose clamp.

Description

BRIEF DESCRIPTION OF DRAWINGS
(1) FIG. **1** is a side view of a spring clamp upon which the hose clamp pliers of the present invention can operate;
(2) FIG. **2** is a side perspective view of a band spring clamp upon which the hose clamp pliers can operate;
(3) FIG. **3** is a front perspective view of hose clamp pliers;
(4) FIG. **4** is a rear perspective view of the hose clamp pliers of FIG. **3**;
(5) FIG. **5** is an exploded perspective view of components of the hose clamp pliers;
(6) FIG. **6** is a side view of hose clamp pliers;
(7) FIG. **7** is a top view of hose clamp pliers;
(8) FIG. **8**A is a top perspective view of a male contact point;
(9) FIG. **8**B is a top view of the male contact point of FIG. **8**A;
(10) FIG. **9**A is a top perspective view of a female contact point;
(11) FIG. **9**B is a top view of the female contact point of FIG. **9**A;
(12) FIG. **10** is a close-up view of a male and a female contact point engaged with a wire spring clamp;
(13) FIG. **11** is a close-up view of the male and female contact points engaged with a band spring clamp;
(14) FIGS. **12**A-**12**E demonstrate usage of the hose clamp pliers operating against a spring clamp.
DETAILED DESCRIPTION OF THE INVENTION
(15) Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention

which may be embodied in other specific structures. While the preferred embodiment has been described, the details may be changed without departing from the invention, which is defined by the claims.

(16) A counterbore is a cylindrical flat-bottomed hole that enlarges another hole, preferably coaxially. A countersink is a cylindrical conically shaped enlargement of another hole, preferably coaxially. Despite this technical difference, throughout this patent the terms are to be defined and used interchangeably.

(17) FIG. **1** is a side view of a wire spring clamp **2** upon which the hose clamp pliers of the present invention can operate. Metal wire is formed into a circular shape, and the two ends **4** of the wire spring clamp **2** overlap, and the resilient force of the metal urges and biases the hose clamp shut. The two ends **4** of the wire spring clamp are pointed radially outwardly. When installing, removing, or repositioning a hose about its respective fitting, the ends **4** of the wire spring clamp can be compressed towards one another to loosen the wire spring clamp **2**. The ends are then released to re-tension the wire spring clamp **2** about a hose (shown later in the sequence of FIGS. **12**A-E).

(18) Referring now to FIG. **2**, a side perspective view of a band spring clamp **6** is shown, upon which the hose clamp pliers of the present invention can also operate. A flat length of metal is formed into a circular shape with overlapping ends. A first end of the band spring clamp **8** is nested between a void space **12** provided towards a second end **14** of the band style spring hose clamp **6**. The result is that the two ends **8** and **14** of the band spring clamp are of different shapes and sizes. At one end a smaller tab-shape end **8** with a distal end **10** is created, and at the other end, a larger hoop-shaped end **14** is formed about void space **12**. Like the wire spring clamp **2**, when installing, removing, or repositioning the band spring clamp **6**, the two ends **8** and **14** can be compressed towards one another to loosen the band spring clamp **6**. The ends **8** and **14** are then released to re-tension the band spring clamp **6** about the hose, similarly to the sequence shown in FIGS. **12**A-E for wire spring clamps.

(19) Referring now to FIG. **3**, a front perspective view of hose clamp pliers **20** is shown. First and second plier arms and handles **22** (of which a handle portion and an arm portion are on opposite ends of pivot point **130**) are preferably each constructed of a single piece of flat metal. Grips **24** can be provided about a proximal portion forming a handle portion of arms **22**. In a preferred embodiment, to simplify manufacturing, each arm **22** can be identical.

(20) A male contact point **50** and a female contact point **80** are provided at distal end of the first and second plier arms **22**. Each of the male and female contact points, **50** and **80**, respectively, are coupled to the first and second plier handles **22** by contact point posts **72** and **100**, respectively, which are inserted through void spaces on arms **22**. Both the male and female contacts **50** and **80** are interior facing, or facing one another.

(21) In a preferred embodiment, a curved disc spring **172** is provided between rear surfaces of the contact points and the jaw face **34** of plier handles **22**. Also in a preferred embodiment, a push on external retaining nut **170** couples contact point posts **72** and **100** to the first and second plier handles **22** at rear jaw face **36**.

(22) In a preferred embodiment, in order to create inward facing jaw face **34** of each plier handle **22**, a jaw twisted portion **32** is created in the initially flat piece of metal of the plier handles **22**. Each arm **22** is twisted preferably 90° toward distal ends of arms **22**, or between pivot point **130** and the contact points **50** and **80**. Alternatively, a rolled end of plier handles **22** can be created as shown at reference numerals 12 and 22 of U.S. Pat. No. 6,389,937, which is incorporated by reference.

(23) Each of the two plier handles and arms **22** rotate about a main joint rivet **130**. At a portion of a periphery of a center portion of plier arms **22**, plier handle teeth **26** are formed. These plier handle teeth **26** engage corresponding teeth **154** carried by ratcheting pawl **150**.

(24) In use, and as will be explained later, the plier handles **22** of the present invention can be operated in either a thumb release engaged position (as shown in FIG. **3**) or a thumb release

disengaged position (as shown in FIG. **12**A). As shown in FIG. **3**, the pliers **20** are in a thumb release engaged position, whereby the plier handle teeth **22** are engaged with corresponding teeth **154** carried by ratcheting pawl **150**. In the thumb release engaged position, teeth **154** carried by ratcheting pawl **150** and plier handle teeth **26** can ratchet by squeezing grips **24** together, which simultaneously rotates plier handle teeth **26** clockwise, and rotates pawl teeth **154** clockwise. Engagement of teeth **26** and teeth **154** thus changes position upon squeezing, moving tooth pairings adjacently inwardly one click at a time.

(25) In use, a user can change between thumb release engaged and disengaged positions by pivoting thumb release **110**, which is preferably knurled. In response to a rearward push by a user, thumb release **110** pivots about thumb release rivet **120**, which is provided in one of the void spaces **30** provided on each plier handle **22**. Pressing inwardly and rearward on thumb release **110** will reposition teeth **154** away from and out of engagement with teeth **26** by pivoting ratcheting pawl **150** about ratcheting pawl rivet **164** (pivotally coupled to its plier handle **22** through a void space **30**). Pivot spring **140** is coupled to one of the plier handles **22**, and also coupled to the ratcheting pawl **150** through pivot spring void space **152**. Pivot spring **140** is biased to urge the grip portions **24** of plier handles **22** away from one another (as well as forcing the male and female contact points **50** and **80** away from each other), as will be described later. In the thumb release disengaged position, the contact points **50** and **80**, and the grips **24** are free to rotate or swing back and forth manually, or remain biased in a full open position in which spring **140** urges maximum separation of the contact points **50** and **80**.

(26) Referring now to FIG. **4**, in a preferred embodiment, thumb release **110** is pivotally coupled at a rear surface of one of the plier handles **22**, while ratcheting pawl **150** is pivotally coupled to a front surface of the same plier handle **22** (as shown in FIG. **3**). Thumb release **110** spans from the rear surface of its plier handle **22** across to the front surface of its plier handle **22**, where ratcheting pawl thumb release contacting surface end portion **166** can react with thumb release ratcheting pawl tab contact surface distal portion **122**. Bent spring end **142** is wrapped around the arm **22** which does not carry thumb release **110**.

(27) Referring now to FIG. **5**, an exploded perspective view of components of the hose clamp pliers **20** is shown. Beginning with female contact point **80**, a generally cup shaped contact point **80** is provided. A preferably generally U-shaped female contact point first notch **92** is created through sidewall **82**, and preferably a deeper preferably generally U-shaped female contact point second notch **96** is provided diametrically opposed to the female contact point first notch **92**. A female contact point large diameter counterbore **84** is provided within the female contact point **80**, creating female contact point large diameter counterbore sidewall **86**. Within female contact point large diameter counterbore **84**, and created deeper than counterbore **84**, a second, small diameter counterbore **88** is provided. The small diameter counterbore **88** has a sidewall **90** depending from the large diameter counterbore **84** to the small diameter counterbore **88**. A female contact point post **100** is formed at a base of female contact point **80**, about which a post groove **102** is formed in order to be coupled with, and receive push on external retaining nut **170**. During assembly, curved disk spring **172** is provided between jaw face **34** and sidewall **82**, to facilitate snug rotation of female contact point **80** about its post **100** when desired.

(28) Male contact point **50**, the unique shape of which will be described later in relation to FIGS. **8**A and **8**B, is similarly installed upon its arm **22**, with male contact point post **72** inserted through a void on arm **22**. Push on external retaining nut **170** is received in male contact point post groove **74**, and curved disk spring **172** is placed between male contact point rear surface **76** and jaw front face **34**.

(29) Referring now to main joint rivet **130**, this rivet is formed with a spring stop **132** about a proximal end of the rivet **130**. A rivet large diameter **134**, for spring **140** to ride and rotate upon, extends to a rivet small diameter **136** which is preferably snug fit within its associated handle void space **30**. The main joint rivet **130** is inserted through spring **140**, joint washer **138**, a handle void

space **30** of the first plier arm **22**, a second handle void space **30** of the second plier arm **22**, and an additional joint washer **138**. A distal end of main joint rivet **30** can be provided with, for instance, a rivet head or other engagement means to keep main joint rivet **130** in place with respect to plier arms **22**. Rivet large diameter **134** carries a looped portion of spring **140**, and rivet large diameter **134** is preferably larger than handle void space **30**, leaving space for spring **140** to rotate and operate.

(30) Referring now to ratcheting pawl **150**, this structure contains a pivot spring void space **152** to receive a bent spring end **142** of spring **140**, as shown in FIG. **3**. Preferably a series of ratcheting pawl teeth **154** are provided at a portion of an outer periphery of ratcheting pawl **150**. A rivet void space **156** is provided, to receive therethrough a pawl rivet **164** which also is placed through a void space on the plier arm **22**, and pawl rivet **164** can be coupled to the plier arm **22** by any means. In a preferred embodiment ratcheting pawl **150** is provided at a front surface of its associated plier arm **22**. A shoulder, or ratcheting pawl jaw stop contact surface **160** is provided to selectively contact, during a maximum open condition of pliers **20**, against handle jaw stop shoulder **38** of the other of the plier arms **22**, as will be described later. A thumb release contacting service **158**, preferably curved, is provided to contact ratcheting pawl tab contact surface **114** of thumb release **110**. Ratcheting pawl tab contact surface **114** can ride upon thumb release contacting service **158** as grips **24** are squeezed to ratchet the pliers **20** closed. A ratcheting pawl thumb release contacting surface end portion **166** is provided to engage release ratcheting pawl tab contact surface distal portion **122** in the thumb release disengaged position as shown in FIG. **12**A. A ratcheting pawl rivet clearance surface **162** is provided to accommodate thumb release rivet **120** (see FIG. **3**).

(31) Thumb release **110** is preferably provided with thumb release grip feature **112**, preferably a series of ridges. Thumb release base portion **116** containing rivet hole **118** is provided in a preferred embodiment at a rear surface of its plier arm **22**. Rivet **120** couples thumb release to its plier arm **22**.

(32) Referring now to FIG. **6**, a side view of hose clamp pliers **20** is shown. Contact points **50** and **80** are aligned to travel towards one another in this view, despite one of the arms **22** overlying the other. This alignment of contact points **50** and **80** is facilitated by twisted portions **32**.

(33) Referring now to FIG. **7**, a top view of hose clamp pliers **20** is shown in the thumb release engaged position. Male contact point **50** is provided with a keeper **66**, the use of which will be described later. A front exterior wall **70** (preferably sloped) of keeper **66**, and an interior wall **68** (preferably flat and vertical), are formed on keeper **66** of male contact point **50**. An open ended channel **64** spans male contact point **50**. A top rear wall **54** of male contact point **50** leads to an inward sloping portion **56** of top wall **54**. From the thumb release engaged position, a user can squeeze grips **24** together to decrease the distance between male and female contact points **50** and **80**. Squeezing grips **24** together relocates ratcheting pawl teeth **154** downwardly with respect to plier handle teeth **26**, one tooth position (click) at a time.

(34) Referring now to FIGS. **8**A and **8**B, a top perspective and a top view, respectively, of male contact point **50** is shown. Male contact point **80** is designed to receive, engage and control either cylindrical end **4** of the wire spring clamp **2** (FIG. **1**), or the hoop-shaped end **14** of band spring clamp **6** (FIG. **2**).

(35) Male contact point post **72** and male contact point post groove **74** are provided in order to couple the male contact **50** to an arm **22**, as described previously. Keeper **66** is a protrusion extending upwardly from base surface **69**. The width and height of keeper **66** are preferably sufficient to fit within and grasp the hoop-shaped end **14** of band spring clamp **6** (see FIG. **11**).

(36) A closed ended channel **62**, adjacent to keeper **66**, is formed within male contact point **50**, and an open ended channel **64** spans above closed ended channel **62** and across a width of male contact point **50**. Closed ended channel **62** is sized widthwise to receive and control hoop-shaped end **14**. If a hoop-shaped end **14** wider than closed ended channel **62** is encountered, the wider hoop-shaped end **14** can be placed within open ended channel **64**.

(37) A contact point notch **52**, preferably U-shaped, is formed through top wall **54**. Notch **52** extends from an exterior of male contact point **50** spanning to open ended channel **64** above closed ended channel **62**.
(38) Preferably, an inward the sloping portion **56** of top wall **54** is provided. An interior sloped surface **60** is formed between top wall **54** depending inwardly to open ended channel **64**. This sloped surface **60** encourages hoop-shaped end **14** into either closed ended channel **62** (preferably) or open ended channel **64**. Interior sidewall **58** extends from interior sloped surface **60** to top wall **54**.
(39) The keeper **66** of male contact point **50** is provided with interior wall **68**, preferably flat, and downwardly and outwardly depending exterior wall **70**.
(40) Referring now to FIGS. **9**A and **9**B, a top perspective and a view of a female contact point **80** is shown. Female contact point post **100** and contact point post groove **102** are provided in order to couple the female contact **80** to an arm **22**, as described previously.
(41) Female contact point **80** is designed to receive, engage and control either a cylindrical end **4** of wire spring clamp **2** (FIG. **1**), or engage the flat tab shaped end **10** of band spring clamp **6** (FIG. **2**). A first larger diameter counterbore or countersink **84** is formed within female contact point **80**. A smaller diameter counterbore **88** is formed, preferably concentrically, within the larger diameter counterbore **84**. A first notch, or slot, or groove **92** (these terms are used interchangeably herein) is formed in a sidewall **82** of the female contact point **80**, the first notch **92** preferably larger in width than the diameter of the intended size of the cylindrical end **4** of the wire spring clamp **2**, and wider than the width of the intended flat tab shaped end **10** of band spring clamp **6**. The notch **92**, preferably U-shaped, extends from an exterior wall **82** of the female contact point **80**, through the larger diameter counterbore **84** and its associated sidewall **86**, and optionally into the smaller diameter counterbore **88**.
(42) A second preferably U-shaped notch **96** is provided diametrically opposed to notch **92**. This notch **96** preferably extends from exterior wall **82** of the female contact point **80**, through the larger diameter counterbore **84** and its associated sidewall **86**, and also through small diameter counterbore sidewall **90** of the small diameter counterbore **88**, leading into small diameter counterbore **88**. In a preferred embodiment, depth **94** of notch **92** is less than depth **98** of notch **96**.
(43) Referring now to FIG. **10**, a close-up view of male and female contact points **50** and **80** respectively is shown, with contact points **50** and **80** engaged with wire spring clamp **2**.
(44) Referring first to female contact point **80**, in use for a wire spring clamp **2**, either female contact point notch **92** or **96** can hold one end **4** of wire spring clamp **2**. The notches **92** or **96** can prevent the end **4** of wire spring clamp **2** from rolling left and right in relation to the female contact point **50**. Female contact point **50** can independently rotate with respect to twisted portion **32**, allowing the grips **24** of the hose clamp pliers **20** to rotate about the position of the hose clamp being worked upon in hard to reach places. Notches **92** or **96** also keep the spring clamp **2** on center, helping dissipate clamping force when pressure is applied to the pliers **20**, and allowing for easier pivoting of the grips **24** relative to the contact point **50** when the contact point **50** is affixed to the spring clamp **2**. The end **4** of wire spring clamp **2** being held by female contact point **80** can be constrained by one of the counterbore sidewalls **90** or **86** (refer to FIG. **9**A), preferably by the sidewall **90** of the smaller diameter counterbore **88**, for greater control of the end **4** of wire spring clamp **2**. This allows for greater control over the end **4** of wire spring clamp **2**.
(45) Referring next to male contact point **50**, in use on wire spring clamp **2**, the male contact point notch **52** holds the other end **4** of wire spring clamp **2**. The male contact point **50** is rotated about its post **72** into a position in which keeper **66** is closest to grip **24** (facing right as shown in FIG. **10**). This exposes notch **52** to end **4**. The notch **52**, similar to notches **92** and **96** of female contact point **80**, can prevent end **4** from rolling left and right in relation to the male contact point **90**. This in turn allows independent rotation of the male contact point **50** with respect to the grips **24**, about post **72**. The end **4** can be constrained within notch **52**, with best control over end **4** when end **4**

contacts keeper interior wall **68**.
(46) Referring now to FIG. **11**, a close-up view of the male and female contact points **50** and **80** engaged with band spring clamp **6** is shown.
(47) In use for a band spring clamp **6**, female contact point **80** is also designed to receive, engage and control the tab-shape end **8** of the band spring clamp **6**. The flat end **8** of the hoop-shaped end of band spring clamp **6** extends through either notch **92** or **96**, and flat end **8** is preferably engaged against a positive stop, for instance resting against either large diameter sidewall **86**, or preferably and as shown, small diameter counterbore sidewall **90**.
(48) Referring now to male contact point **50** controlling hoop-shaped end **14**, to engage band spring clamp **6** with male contact point **50**, a user places the male contact point **50** into a position in which keeper **66** is farthest from grip **24** (facing left as shown).
(49) Keeper **66** is placed within void space **12** of hoop-shaped end **14** of band spring clamp **6**, for positive securement of the hoop-shaped end **14**, and prevention of rotation of the hoop-shaped end **14**. Interior wall **68** of keeper **66** can apply an inward pulling force against hoop-shaped end **14** as contact points **50** and **80** are drawn toward one another as a user squeezes grips **24**. Hoop-shaped end **14** can rest within closed ended channel **62** and against sidewall **63** (not visible from the viewpoint in FIG. **11**, instead see FIGS. **8**A and **8**B). During installation of hoop-shaped end **14** into male contact point **50**, interior sidewall **58** acts as a stop against which hoop-shaped end **14** can be contained briefly, until hoop-shaped end **14** is guided down interior sloped surface **60** and into closed ended channel **62** (or open ended channel **64**). In the case of a hoop-shaped end **14** wider than closed ended channel **62**, hoop-shaped end **14** can span across closed ended channel **62** to be received within open ended channel **64**.
(50) Referring now to FIGS. **12**A-**12**E usage of the hose clamp pliers **20** operating against a spring clamp **2** is shown. Spring clamp **2** is placed about hose **16**, where spring clamp **2** rests in a biased closed position.
(51) Beginning with FIG. **12**A, the pliers **20** are in the thumb release disengaged position, with grips **24** (and therefore contact points **50** and **80**) wide open, and ratcheting pawl jaw stop contact surface **160** resting against handle jaw stop shoulder **38** of the top arm **22**. Travel in the open direction is limited by ratcheting pawl jaw stop contact surface **160** resting against handle jaw stop shoulder **38**. In the thumb release disengaged position, thumb release **110** is positioned behind (or above in this view) ratcheting pawl **150** relative to pivot point **130**, and ratcheting pawl thumb release contacting surface end portion **166** is in contact with thumb release ratcheting pawl tab contact surface distal portion **122**. In the thumb release disengaged position, teeth **154** and **26** are separated or disengaged.
(52) Because pliers **20** is being used with a spring clamp **2** in the example shown in the sequence of FIGS. **12**A-**12**E, keeper **66** is oriented closest to pivot point **130**. Alternatively, if pliers **20** were being used with a band spring clamp **6**, keeper **66** would be oriented 180° from that position, with keeper **66** farthest from pivot point **130** (see FIG. **11**).
(53) Referring now to FIG. **12**B, pliers **20** remain in the thumb release disengaged position, and contact points **50** and **80** have been brought into receiving contact with spring ends **4** by squeezing grips **24** together. At the user's choice, pliers **20** could also be in the thumb release engaged position to draw contact points **50** and **80** into receiving contact with spring ends **4**.
(54) Next, if the pliers **20** are not already in the thumb release engaged position, thumb release **110** can be rotated over ratcheting pawl **150** (to the left as shown in relation to the position of thumb release **110** as shown in FIG. **12**B) to place the thumb release **110** in the position shown in FIG. **12**C. A user squeezes grips **24** together, drawing contact points **50** and **80** closer together, thereby loosening spring clamp **2** relative to hose **16**. If a user releases grips **24** in the thumb release engaged position, contact points **50** and **80** are kept in position and now allowed to open. Spring clamp **2** can then be manipulated as desired.
(55) Referring now to FIG. **12**D, after spring clamp **2** has been adjusted relative to hose **16** as

spring clamp **2** is open, while retaining a squeezing force against grips **24**, the user can place the pliers **20** in the thumb release disengaged position by simultaneously squeezing grips **24** and pulling back against thumb release **110**, until the thumb release **110** reaches the position shown in FIG. **12**E and the teeth **154** and **26** are disengaged. As the user weakens the squeeze on grips **24** as shown in FIG. **12**E, contact points **50** and **80** are separated by action of spring **140**, allowing the spring clamp **2** to relax and tighten back up against hose **16**. At this point, the user is free to remove pliers **20** from the spring clamp **2**, returning the pliers to the position shown in FIG. **12**A.

(56) The foregoing is considered as illustrative only of the principles of the invention. Furthermore, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described. While the preferred embodiment has been described, the details may be changed without departing from the invention, which is defined by the claims.

Claims

1. A hose clamp pliers for use with a wire spring clamp and a band spring clamp, said hose clamp pliers comprising: a first contact point rotatably carried by a first pliers arm, said first contact point comprising a first notch through an exterior sidewall of said first contact point, and further comprising a keeper protruding from a base surface of said first contact point; said first contact point configured to receive, in a first position, an end portion of said wire spring clamp through said notch; said first contact point configured to receive, in a second position rotated from said first position, a hoop-shaped end of said band spring clamp about said keeper, said keeper configured to extend into a void space of said hoop-shaped end of said band spring clamp; said first contact point further comprising a closed ended channel formed in said first contact point, said closed ended channel comprising an interior sidewall depending from said base surface and having first and second lateral ends, and an open ended channel extending across said closed ended channel beyond the first and second lateral ends, said open ended channel comprising at least a portion of said base surface and a rear wall extending from said base surface, said open ended channel extending across said first contact point between said notch and said keeper and spanning said closed ended channel; a second contact point carried by a second pliers arm, said second contact point configured to receive an end portion of said wire spring clamp, and configured to receive a tab-shaped end of said band spring clamp.

2. The hose clamp pliers according to claim 1, said second contact point comprising: a first counterbore interior section; said second contact point configured to receive said end portion of said wire spring clamp within said first counterbore interior section of said second contact point, and configured to receive said tab-shaped end of said band spring clamp within said first counterbore interior section of said second contact point.

3. The hose clamp pliers according to claim 1, wherein said closed ended channel is configured to receive a distal end of said hoop-shaped end of said band spring clamp, said distal end of said hoop-shaped end having a first width.

4. The hose clamp pliers according to claim 1, wherein the open ended channel is formed through said sidewall of said first contact point.

5. The hose clamp pliers according to claim 1, said first notch of said first contact point extending towards said keeper.

6. The hose clamp pliers according to claim 1, said first notch of said first contact point configured to direct said end portion of said wire spring clamp towards said keeper.

7. The hose clamp pliers according to claim 1, said first contact point further comprising a sloped surface spanning said notch towards said keeper.

8. The hose clamp pliers according to claim 1, said first notch of said first contact point positioned across said first contact point diametrically opposed to said keeper.

9. The hose clamp pliers according to claim 1, said first contact point further comprising a keeper sidewall extending towards at least one of the closed ended channel and the open ended channel formed in said first contact point.
10. The hose clamp pliers according to claim 1, said second contact point further comprising at least a first notch of said second contact point through a sidewall of said second contact point.
11. The hose clamp pliers according to claim 10, said second contact point further comprising a second notch extending through said sidewall of said second point into said first counterbore interior section.
12. The hose clamp pliers according to claim 11, said first notch of said second contact point comprising a first depth, and said second notch comprising a second depth, said second depth greater than said first depth.
13. The hose clamp pliers according to claim 2, said second contact point further comprising a second counterbore interior section, through which said first counterbore interior section is formed.
14. The hose clamp pliers according to claim 1, said first contact point configured to receive a distal end of said hoop-shaped end of said band spring clamp between said keeper and said first notch.
15. The hose clamp pliers according to claim 1, said first contact point configured to receive said end portion of said wire spring clamp between said keeper and said first notch.
16. The hose clamp pliers according to claim 1, wherein said second contact point is rotatably carried by said second pliers arm.
17. A hose clamp pliers for use with a wire spring clamp and a band spring clamp, said hose clamp pliers comprising: a first contact point carried by a first pliers arm, said first contact point rotatable about a first axis; said first contact point comprising a first notch through an exterior sidewall of said first contact point, a base surface substantially perpendicular to said first axis, and a keeper protruding from said base surface substantially parallel to said first axis; said first contact point configured to receive, in a first position, an end portion of said wire spring clamp through said notch; said first contact point further comprising a closed ended channel formed in said first contact point, said closed ended channel comprising a sidewall depending from said base surface and having first and second lateral ends, and an open ended channel extending across said closed ended channel beyond the first and second lateral ends, said open ended channel comprising at least a portion of said base surface and a rear wall extending from said base surface, said open ended channel extending across said first contact point between said notch and said keeper and spanning said closed ended channel; a second contact point carried by a second pliers arm, said second contact point comprising a primary notch depending a first depth from a top surface of said second contact point, and a second notch depending a second depth from said top surface of said second contact point, said first depth greater than said second depth.