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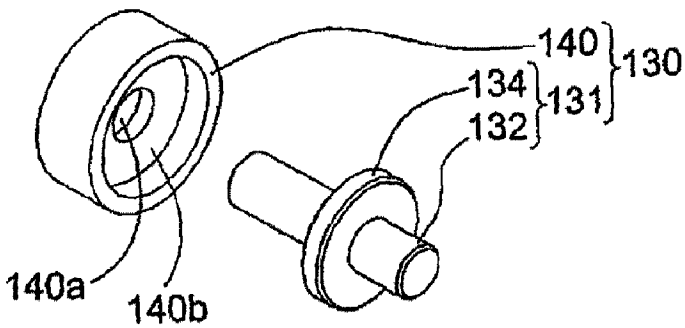
(54) Title: LOCK MECHANISM AND HAND TOOL HAVING THE SAME



(57) Abrégé/Abstract:
A lock mechanism for a hand tool having tow handles, which comprises a latch and a retainer for retaining the latch. The latch mechanism comprises a disc and a shaft passing through and fixed with the disc. The shaft is coaxial with the disc. The lock mechanism is disposed within the hand tool.

ABSTRACT

A lock mechanism for a hand tool having tow handles, which comprises a latch and a retainer for retaining the latch. The latch mechanism comprises a disc and a shaft passing through and fixed with the disc. The shaft is coaxial with the disc. The lock mechanism is disposed within the hand tool.

LOCK MECHANISM AND HAND TOOL HAVING THE SAME

FIELD

0001 The present disclosure relates to a lock mechanism for a hand tool, in particular to pliers or crimp tools having two handles.

BACKGROUND

0002 Pliers and crimp tools are frequently used for machining articles. A crimp tool can bend, shear, strip and crimp insulated wiring and connectors thereof. These connectors include the RJ-**45** connector, a connector standardized as the **8P8**C modular connector, and the RJ-**11** connector, a connector for telephone connections etc. A crimp tool usually includes two handles to be grasped by a user during operation. Generally speaking, when the crimp tool is in a contracted position, the two handles abut against or are adjacent to each other, and when the crimp tool is in an expanded position, the two handles are separate from each other. As a labor-saving device, some crimp tools include a biasing mechanism such as a spring for biasing one handle against the other so that the handles tend to be urged into an expanded position. Users thus only need to move the handles from the expanded position to the contracted position when using the crimp tool, while the biasing mechanism will return the handles back to the expanded position.

0003 A crimp tool or a plier occupies smallest space when the handles are contracted and close to each other. Therefore, when the crimp tool or the plier is not in use and is to be stored, the handles thereof should first be contracted and fixed. To prevent the handles from leaving the contracted position, a plier as described in Taiwan Pat. No. **1363676** is provided with a snap ring at the end of one handle to be engaged with a knob at the end of the other handle so that the two handles can be fixed after they are contracted for storage. However, the snap ring and the knob are disposed externally to the plier, and not only occupy additional space but may also cause injury.

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0004 Given the above, there is need for a lock mechanism for hand tools such as pliers or crimp tools having two handles that does not occupy additional space and is safe for users.

BRIEF SUMMARY

0005 In one embodiment, a lock mechanism for a hand tool is provided, which comprises: a latch and a retainer for retaining the latch. The latch comprises: a disc and a shaft passing through the disc; the middle of the shaft is fixed with the center of the disc. The shaft is coaxial with the disc, and they rotate together with stability.

0006 In another embodiment, a hand tool is provided, which comprises: a first handle, a second handle, and a lock mechanism. The second handle has an end portion pivotally connected with an end portion of the first handle, wherein the second handle pivots between a first position where the second handle is away from the first handle and a second position where the second handle is adjacent to the first handle. The lock mechanism comprises: a latch and a retainer. The latch comprises: a disc and a shaft passing through and fixed with the disc. The shaft is coaxial with the disc. The latch is pivotally disposed at the end portion of the first handle along a transverse direction and is switchable between a third position and a fourth position. The retainer is disposed at the end portion of the first handle for retaining the latch at the third position or the fourth position. When the latch is at the third position, the shaft of the latch detains the second handle at the first position and when the latch is at the fourth position, the disc of the latch detains the second handle at the second position.

0007 In one embodiment, there is provided a lock mechanism for a hand tool, including a latch. The latch includes a disc and a shaft passing through and fixed with the disc, the shaft being coaxial with the disc. The lock mechanism further includes a retainer for retaining the latch. The retainer is a sleeve having a through hole and a recess formed therein, the latch is movably inserted into the recess, and the recess communicates with the through hole.

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0007a In another embodiment, there is provided a hand tool, including a first handle and a second handle having an end portion pivotally connected with an end portion of the first handle. The second handle pivots between a first position where the second handle is away from the first handle and a second position where the second handle is adjacent to the first handle. The hand tool further includes a lock mechanism, including a latch. The latch includes a disc and a shaft passing through and fixed with the disc, the shaft being coaxial with the disc. The latch is pivotally disposed at the end portion of the first handle along a transverse direction and is switchable between a third position and a fourth position. The lock mechanism further includes a retainer, disposed at the end portion of the first handle for retaining the latch at the third position or the fourth position. When the latch is at the third position, the shaft detains the second handle at the first position and when the latch is at the fourth position, the disc detains the second handle at the second position.

BRIEF DESCRIPTION OF THE DRAWINGS

0008 FIG. **1**A is a schematic view showing the handles of the crimp tool of one embodiment in an expanded position;

0009 FIG. **1**B is a schematic view showing the handles of the crimp tool of FIG. **1**A in a contracted position;

0010 FIG. **2**A is a schematic structural view of the left side of the crimp tool of FIG. **1**A;

0011 FIG. **2**B is a schematic structural view of the left side of the crimp tool of FIG. **1**B;

0012 FIG. **3**A is a schematic view showing the lock mechanism in the embodiment of Fig. **1**A wherein the latch and the retainer are assembled; and

0013 FIG. **3**B is a schematic view showing the lock mechanism in the embodiment of Fig. **1**A wherein the latch is detached from the retainer.

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DETAILED DESCRIPTION

0014 The characteristics, subject matter, advantages, and effects of the present disclosure are detailed hereinafter by reference to the embodiments described herein and the accompanying drawings. It is understood that the drawings referred to in the following description are intended only for purposes of illustration and do not necessarily show the actual proportion and precise arrangement of the embodiments. Therefore, the proportion and arrangement shown in the drawings should not be construed as limiting or restricting the scope of the teachings herein.

0015 Please refer to FIGS. **1**A and **1**B. FIG. **1**A shows the handles **110**, **120** of the crimp tool **100** of one embodiment in an expanded position and FIG. **1**B shows the handles **110**, **120** of the crimp tool **100** of the embodiment in a contracted position. As shown in FIGS. **1**A and **1**B, the crimp tool **100** comprises: a first handle **110**, a second handle **120**, and a lock mechanism **130**. The second handle **120** has an end portion **122** pivotally connected with an end portion **112** of the first handle **120**, wherein the second handle **120** pivots along a rotational path (R) between a first position (P**1**) where the second handle **120** is away from the first handle **110** (as shown in FIG. **1**A) and a second position (P**2**) where the second handle **120** is adjacent to the first handle **110** (as shown in FIG. **1**B). As shown in FIGS. **2**A and **2**B, a biasing element, which is a spring (S), is provided at the pivot of the end portion **112** of the first handle **110** and the end portion **122** of the second handle **120**. When the two handles are moved toward each other (e.g., grasped by a hand of a user), the spring (S) biases the second handle **120** so that the second handle **120** tends to move toward the first position (P**1**) along the rotational path (R). The head **150** of the crimp tool **100** has a crimping element **152** for crimping a connector of insulated wiring. When the second handle **120** is pressed to move from the first position P**1** along the path (R) to the second position (P**2**), the crimping element **152** is indirectly actuated by the second handle **120** to move upward along a vertical direction (L**1**) to a crimping position as shown in FIG. **1**B to crimp a connector.

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0016 As shown in FIG.2A and FIG.2B, the end portion **112** of the first handle **110** comprises a first plate **112**a and a second plate **112**b opposite the first plate **112**a. The end portion **122** of the second handle **120** comprises a third plate **122**a and a fourth plate **122**b opposite the third plate **122**a, wherein the third plate **122**a and the fourth plate **122**b of the end portion **122** of the second handle **120** are sandwiched between and pivotally connected with the first plate **112**a and the second plate **112**b of the end portion **112** of the first handle **110**. The head **150** comprises a fifth plate **150**a and a sixth plate **150**b opposite the fifth plate **150**a. The fifth plate **150**a and the sixth plate **150**b of the head **150** are sandwiched between and fixed to the first plate **112**a and the second plate **112**b of the end portion of the first handle **110**. As shown in FIGS **2**A and **2**B, the fifth plate **150**a and the sixth plate **150**b of the head **150** are generally aligned with the third plate **122**a and the fourth plate **122**b of the end portion **122** of the second handle **120** respectively in a direction (L**2**) transverse to the vertical direction (L**1**). As such, when the second handle **120** is pressed to move along the rotational path (R) toward the first handle **110** to the second position (P**2**), the configurations of the third plate **122**a and the fourth plate **122**b of the end portion **122** of the second handle **120** cause the upper peripheral surfaces of the third plate **122**a and the fourth plate **122**b to abut against the lower peripheral surfaces of the fifth plate **150**a and the sixth plate **150**b of the head **150** so that the second handle **120** is detained from moving further toward and abut the first handle **110**.

0017 FIG. **3**A shows a perspective view of the lock mechanism **130** in one embodiment. FIG. **3**B shows an exploded view of the lock mechanism **130**. As shown in FIGS. **3**A and **3**B, the lock mechanism **130** comprises: a latch **131** and a retainer **140**. The latch **131** comprises: a disc **134** and a shaft **132** passing through the disc **134** and the area around the middle of the shaft **132** is fixed with the center of the disc **134**. The shaft **132** is coaxial with the disc **134**. Preferably, the shaft **132** is integrally formed with the disc **134**. The retainer **140** is a sleeve having a through hole **140**a and a recess **140**b formed therein. The latch **131** is movably inserted into the recess **140**b, and the recess **140**b communicates with the through hole **140**a. The sleeve is made of elastic material, preferably polyurethane. The diameter of the shaft **132** is smaller than that of the disc **134**.

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0018 As shown in FIGS. **2**A and **2**B, the latch **131** is pivotally provided at the end portion **112** of the first handle **110** along the transverse direction (L2). Specifically, the shaft **132** of the latch **131** is pivotally supported at the first plate **112**a and the second plate **112**b of the end portion **112** of the first handle **110** with its two ends, respectively. The latch **131** is axially moveable along the transverse direction (L2) and accordingly is switchable between a third position (as shown in FIG. **2**A) and a fourth position (as shown in FIG. **2**B) so as to detain the second handle **120** in a first position (P1) or a second position (P2). When the latch **131** is at the third position as shown in FIG. **2**A, the disc **134** is within the recess **140**b and one end of the shaft **132** protrudes from a side surface of the first plate **112**a of the first handle **110**. When the latch **131** is at the fourth position as shown in FIG. **2**B, the disc **134** at least partially protrudes from the recess **140**b along the transverse direction (L2) and the other end of the shaft **132** protrudes from a side surface of the second plate **112**b of the first handle **110**.

0019 When the latch **131** is at the third position, the second handle **120** is pivotable along the rotational path (R) between the first position (P1) and the second position (P2). In this situation, as shown in FIGS **1**A and **2**A, if there is no external force applied to the second handle **120**, the spring (S) biases the second handle **120** so that it moves away from the first handle **110** and the shaft **132** of the latch **131** detains the second handle **120** at the first position (P1). As illustrated in FIGS. **1**B and **2**B, when the second handle **120** is pressed so that it moves toward the first handle **110** to the second position (P2), the latch **131** is moved from the third position along the transverse direction (L2) to the fourth position and the disc **134** of the latch **131** detains the second handle **120** at the second position (P2). In this situation, the second handle **120** is fixed at the second position (P2) and the crimp tool **100** occupies the smallest space, which is convenient for storage. In view of the above, by switching the latch **131** between the third position and the fourth position thereof, a user can detain the second handle **120** at the first position (P1) or at the second position (P2).

0020 The retainer **140** of this embodiment is disposed to not be located in the rotational path (R) of the second handle **120** between the first position (P1) and the second position (P2). In one embodiment, the retainer **140** is a sleeve made of elastic material, preferably polyurethane. At least a part of the sleeve is sandwiched between the third plate

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122a and the fourth plate **122**b of the end portion **122** of the second handle **120**. The length of the sleeve along the transverse direction (L**2**) is approximately the same as the distance between the third plate **122**a and the fourth plate **122**b of the end portion **122** of the second handle **120**. In another embodiment, at least a part of the sleeve is sandwiched between the fifth plate **150**a and the sixth plate **150**b of the head **150**. In that case, the length of the sleeve along the transverse direction (L**2**) is approximately the same as the distance between the fifth plate **150**a and the sixth plate **150**b of the head **150**. In an alternative embodiment, one part of the sleeve is sandwiched between the third plate **122**a and the fourth plate **122**b of the end portion **122** of the second handle **120** and the other part of the sleeve is sandwiched between the fifth plate **150**a and the sixth plate **150**b of the head **150**.

0021 In one embodiment, the retainer **140** is a sleeve having a through hole **140**a and a recess **140**b formed therein. The latch **131** is movably inserted into the recess **140**b, which communicates with the through hole **140**a. The shaft **132** passes through the through hole **140**a of the sleeve **140** with one end thereof. Two ends of the shaft **132** are pivotally supported at the end portion **112** of the first handle **110**. When the latch **131** is disposed at the third position, the latch **131** is received within the recess **140**b and the exposed side surface of the disc **134** of the latch **131** is generally flush with a side surface of the sleeve **140**. When the latch **131** is pressed to move along the transverse direction (L**2**) from the third position to the fourth position, the disc **134** is moved from the recess **140**b to at least partially protrude therefrom.

0022 As such, when the latch **134** is received in the recess **140**b (i.e., in the third position), the shaft **132** is in the rotational path (R) of the second handle **120**. Where the handles **110**, **120** of the crimp tool **100** are not grasped, the second handle **120** is biased by the spring (S) to move away from the first handle **110** and the configurations of at least one of the third plate **122**a or the fourth plate **122**b of the end portion **122** of the second handle **120** cause the at least one of the upper peripheral surfaces of the third plate **122**a or the fourth plate **122**b to abut against the shaft **132** to detain the second handle **120** at the first position (P**1**). In the embodiment shown in the drawings, both the upper peripheral surfaces of the third plate **122**a and the fourth plate **122**b abut against the side of the shaft **132**.

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0023 As shown in FIG. **2**A, when the upper peripheral surfaces of the third plate **122**a and the fourth plate **122**b abut against the shaft **132** (i.e., the second handle is at the first position (P1)), since the diameter of the disc **134** is larger than that of the shaft **132** abutted by the fourth plate **122**b, the upper portion of the fourth plate **122**b is located beside and overlaps the disc **134** in the transverse direction (L**2**) so as to prevent the latch **134** from moving from the third position toward the fourth position along the transverse direction (L**2**). In this situation, the second handle **120** is free to pivot between the first position (P1) and the second position (P**2**) along the rotational path (R) and the crimp tool **100** is not locked. In an alternative embodiment, it can be the upper peripheral surfaces of only one of the third plate **122**a and the fourth plate **122**b that abuts against the shaft **132** and it is the third plate **122**a that prevents the latch **134** from moving outward.

0024 When the second handle **120** is pressed so that it gradually moves from the first position (P1) toward the second position (P**2**), the overlapping area between the upper portion of the fourth plate **122**b and the disc **134** of the latch **131** gradually decreases. When the second handle **120** reaches the second position (P**2**), as shown in FIGS. **1**B and **2**B, the upper portion of the fourth plate **122**b does not overlap the disc **134** of the latch **131** in the transverse direction (L**2**) and a user can press against the shaft **132** of the latch **131** so that the latch **131** moves from the third position (as shown in FIG. **2**A) to the fourth position (as shown in FIG.**2**B). As such, the disc **134** is moved along the transverse direction (L**2**) from the recess **140**b to at least partially protrude from the recess **140**b and in the rotational path (R) of the second handle **120**. When the user releases the pressure grasped on the second handle **120**, the peripheral surface of the fourth plate **122**b is urged by the spring (S) to abut against the peripheral surface of the disc **134** so that the second handle **120** is detained (locked) at the second position (P**2**) and cannot be moved away from the first handle **110**.

0025 When the second handle **120** is at the second position (P**2**) and locked by the latch **131**, the crimp tool occupies the smallest space. This is called storage mode. Also, when second handle **120** is at the second position (P**2**), the fourth plate **122**b is not in the path of the latch **131** between the third position and the fourth position. The latch **131** thus is switchable between the third position and the fourth position. If a user would like to switch the crimp tool

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100 from storage mode to working mode, he/she can simply move the latch **131** from the fourth position to third position by pressing the shaft **132** of the latch that protrudes from the side surface of the second plate **112b** of the first handle as shown in FIG. **2B** so that the disc **134** retreats back to the recess **140b** of the sleeve **140**. After the retreat, the second handle **120** is movable along the rotational path (R) toward the first handle **110** and is freely pivotable between the first position (P1) and the second position (P2).

0026 In an alternative embodiment in which the opening of the recess **140b** is arranged to face the first plate **112a** of the first handle **110** (in the embodiment of the drawings, the recess **140b** faces the second plate **112b**), it will be the third plate **122a** that controls whether the latch **131** is switchable between two positions along the transverse direction (L2).

0027 The lock mechanism **130** in one embodiment is simple in structure but useful, and basically contains two elements: the latch **131** having the disc **134** and the shaft **132** and the retainer **140**. Furthermore, the lock mechanism **130** is generally disposed within the crimp tool **110**. Thus, it does not occupy additional space and will not injure a user. In addition to a crimp tool, the lock mechanism **130** can be used on any suitable hand tools that have two handles, such as pliers or the like.

0028 The foregoing embodiments are illustrative of the technical concepts and characteristics of the teachings herein so as to enable a person skilled in the art to gain insight into the contents disclosed herein and to implement the present teachings accordingly. However, it is understood that the embodiments are not intended to restrict the scope of the teachings herein. Hence, all equivalent modifications to and variations of the disclosed embodiments made without departing from the spirit and principle of the present teachings should fall within the scope of the concepts described herein.

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EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A lock mechanism for a hand tool, comprising:

a latch, comprising:

a disc; and

a shaft passing through and fixed with the disc, the shaft being coaxial with the disc; and

a retainer for retaining the latch,

wherein the retainer is a sleeve having a through hole and a recess formed therein, the latch is movably inserted into the recess, and the recess communicates with the through hole.

2. The lock mechanism according to claim **1**, wherein the shaft is integrally formed with the disc.

3. The lock mechanism according to claim **2**, wherein the sleeve is made of elastic material.

4. The lock mechanism according to claim **3**, wherein the elastic material is polyurethane.

5. The lock mechanism according to claim **1**, wherein the sleeve is made of elastic material.

6. A hand tool, comprising:

a first handle;

a second handle having an end portion pivotally connected with an end portion of the first handle, wherein the second handle pivots between a first position where the second handle is away from the first handle and a second position where the second handle is adjacent to the first handle;

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a lock mechanism, comprising:

a latch, comprising:

a disc; and

a shaft passing through and fixed with the disc, the shaft being coaxial with the disc,

wherein the latch is pivotally disposed at the end portion of the first handle along a transverse direction and is switchable between a third position and a fourth position; and

a retainer, disposed at the end portion of the first handle for retaining the latch at the third position or the fourth position,

wherein when the latch is at the third position, the shaft detains the second handle at the first position and when the latch is at the fourth position, the disc detains the second handle at the second position.

7. The hand tool according to claim **6**, wherein the shaft is integrally formed with the disc.

8. The hand tool according to claim **7**, wherein the retainer is not in the path of the second handle between the first position and the second position.

9. The hand tool according to claim **7**, wherein the retainer is a sleeve having a through hole and a recess formed therein, the latch is movably inserted into the recess, and the recess communicates with the through hole.

10. The hand tool according to claim **9**, wherein the sleeve is made of elastic material.

11. The hand tool according to claim **9**, wherein the elastic material is polyurethane.

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12. The hand tool according to claim **9**, wherein when the latch is at the third position, the disc is within the recess and when the latch is at the fourth position, the disc at least partially protrudes from the recess along the transverse direction.

13. The hand tool according to claim **9**, wherein the end portion of the first handle comprises a first plate and a second plate opposite the first plate, the end portion of the second handle comprises a third plate and a fourth plate opposite the third plate, wherein the third plate and the fourth plate of the end portion of the second handle are sandwiched between the first plate and the second plate of the end portion of the first handle, and a part of the sleeve is sandwiched between the third plate and the fourth plate of the end portion of the second handle.

14. The hand tool according to claim **13**, wherein the length of the sleeve along the transverse direction is approximately the same as the distance between the third plate and the fourth plate of the end portion of the second handle.

15. The hand tool according to claim **13**, further comprising a head for machining a connector, the head comprising a fifth plate and a sixth plate opposite the fifth plate, the fifth plate and the sixth plate of the head are sandwiched between the first plate and the second plate of the end portion of the first handle and a part of the sleeve is sandwiched between the fifth plate and the sixth plate of the head.

16. The hand tool according to claim **15**, wherein the length of the sleeve along the transverse direction is approximately the same as the distance between the fifth plate and the sixth plate of the head.

17. The hand tool according to claim **13**, wherein when the latch is at the third position, the shaft detains one of the third plate and the fourth plate of the second handle at the first position and when the latch is at the fourth position, the disc detains the one of the third plate and the fourth plate of the second handle at the second position.

18. The hand tool according to claim **17**, wherein when the second handle is at the first position, the one of the third plate and the fourth plate of the second handle is

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positioned to prevent the latch from moving from the third position toward the fourth position.

19. The hand tool according to claim **17**, wherein when the second handle is at the second position, the one of the third plate and the fourth plate of the second handle is not in the moving path of the latch between the third position and the fourth position.

20. The hand tool according to claim **6**, wherein an elastic element is disposed at the pivot of the end portion of the first handle and the end portion of the second handle for biasing the second handle toward the first position.

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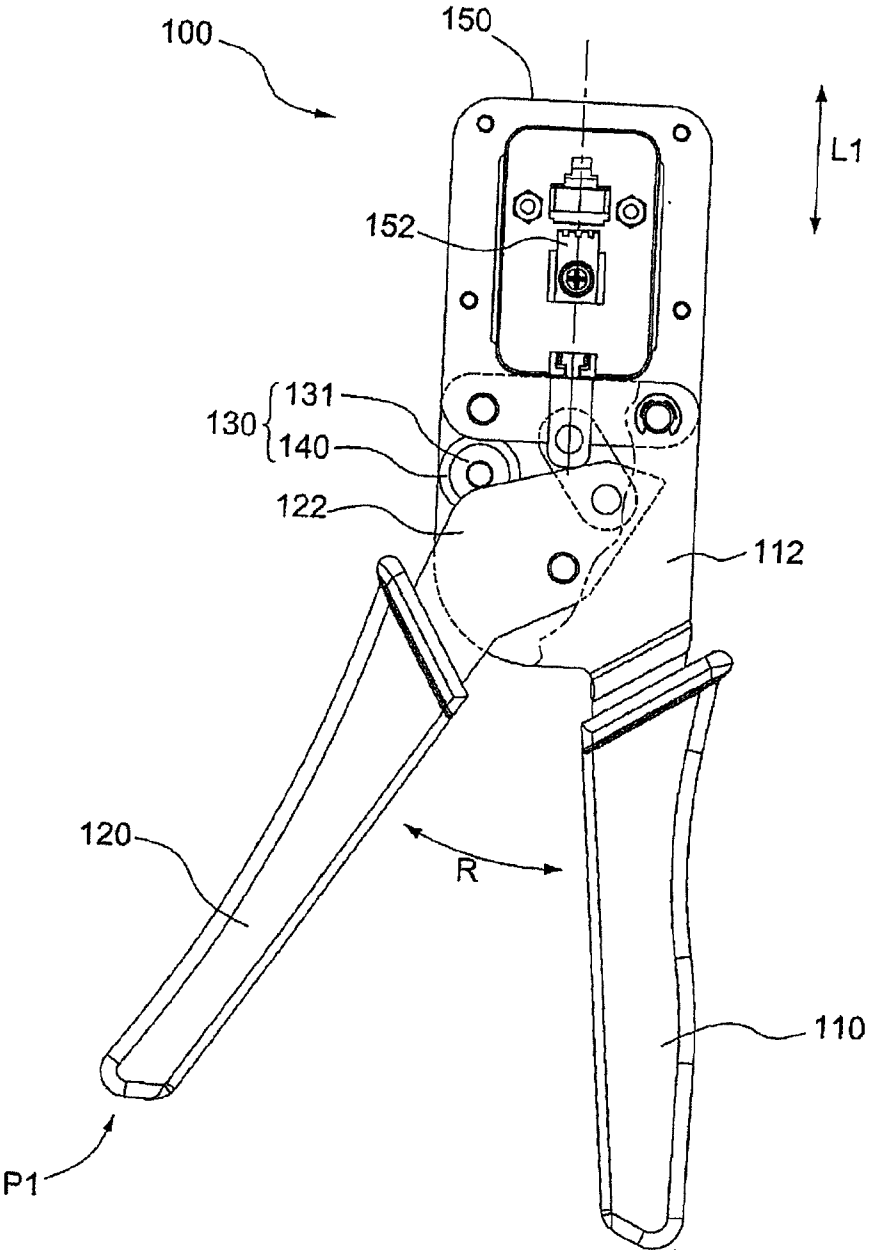


Fig.1A

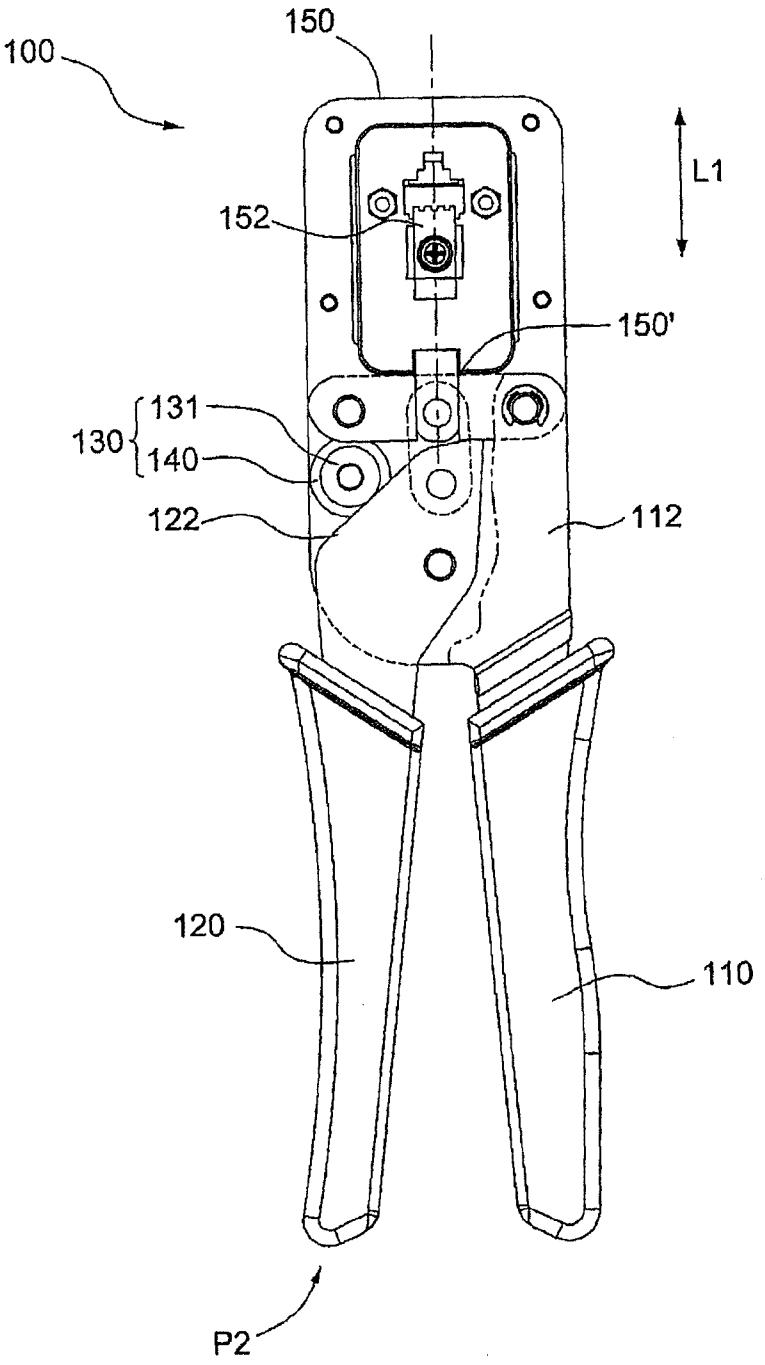


Fig.1B

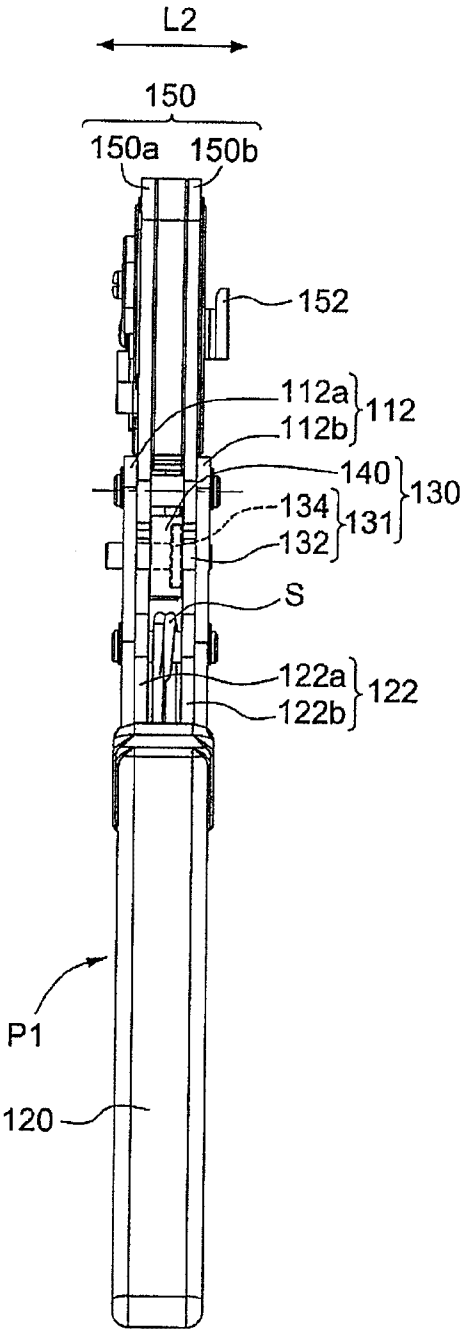
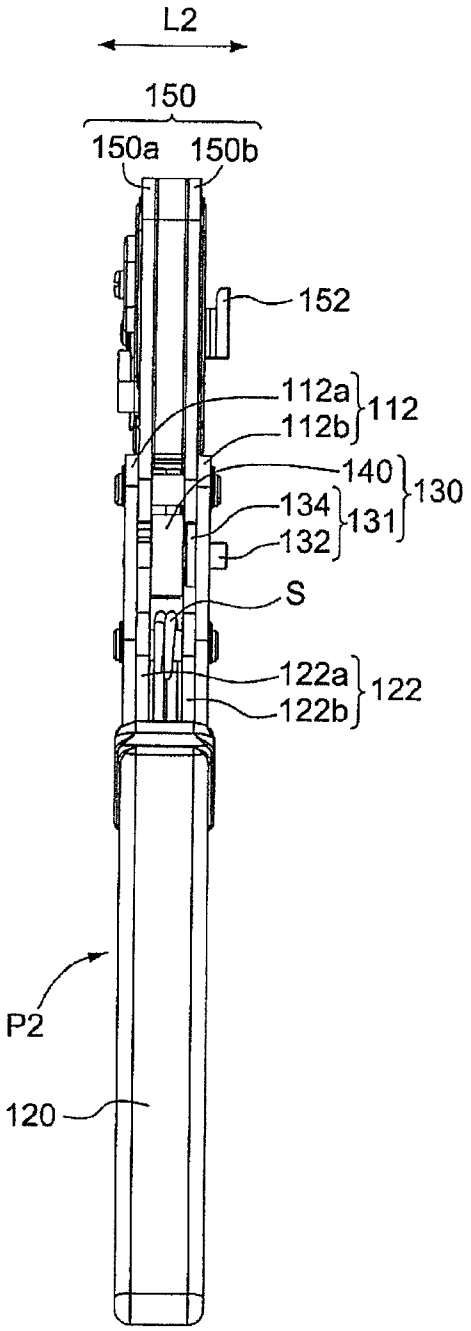

L2
150
150a
150b
152
112a
112b
112
140
134
131
132
130
S
122a
122b
122
P1
120

Fig.2A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150
150a
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P2
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Fig.2B

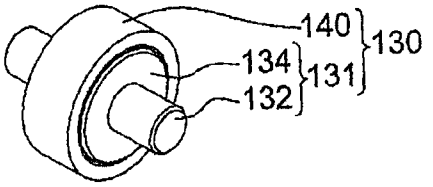


Fig.3A

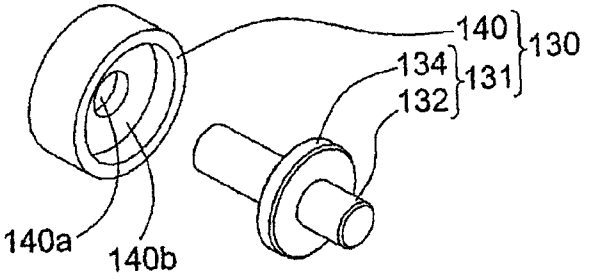
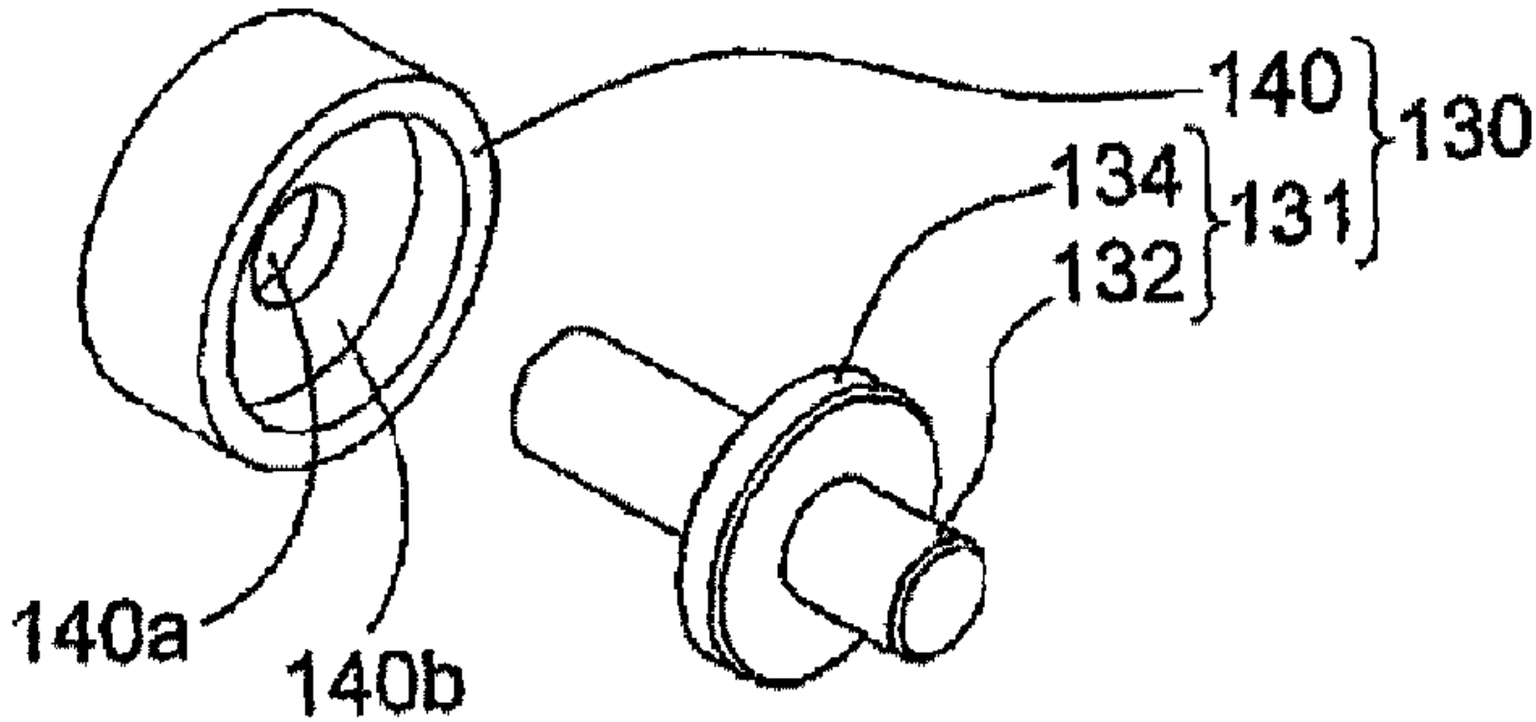


Fig.3B


140
130
134
131
132
140a
140b