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Joeckel

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[54] **PLIER TYPE TOOL**

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[52] **U.S. Cl.** ..... **81/367,** 81/5.1 R, 81/425 R

[51] **Int. Cl.** **B25b 7/12,** B25b 7/02

[58] **Field of Search** ..... 81/426, 425 R, 425 A, 418, 81/367, 380, 5.1; 7/5.4

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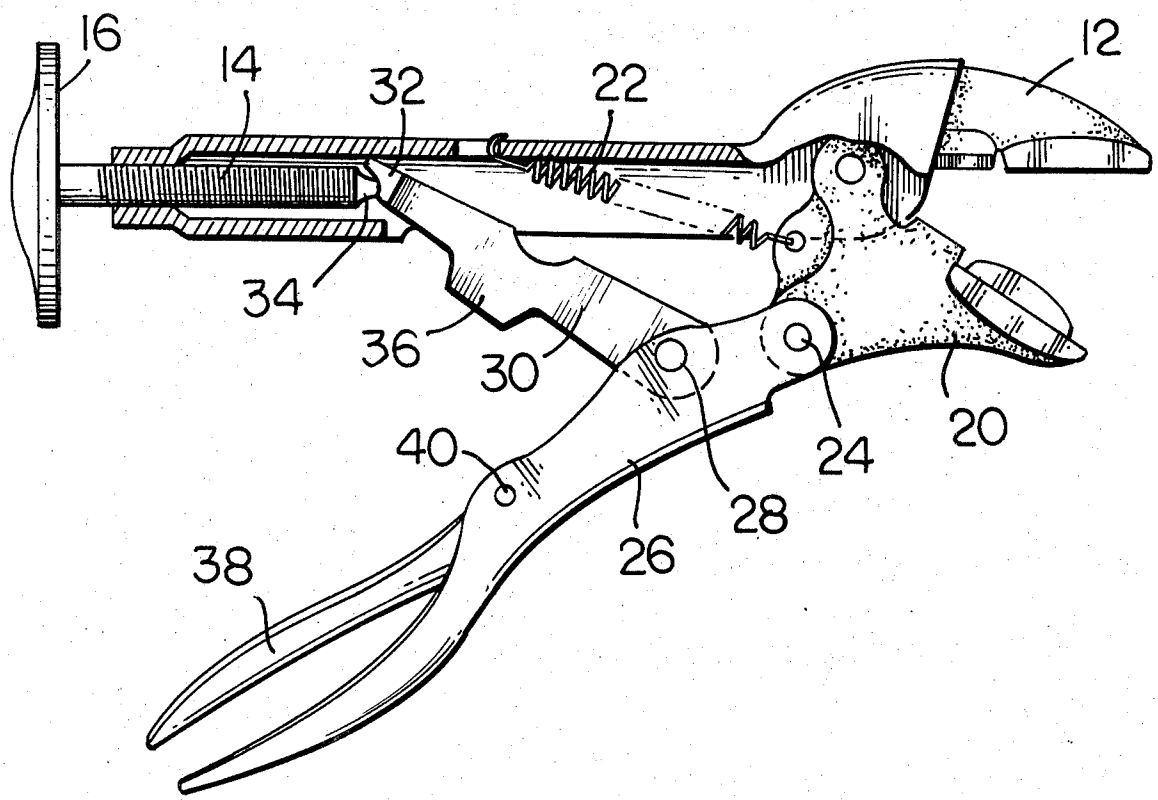
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Primary Examiner—Al Lawrence Smith
Assistant Examiner—Roscoe V. Parker
Attorney, Agent, or Firm—Albert L. Jeffers; Roger M. Rickert

[57] **ABSTRACT**

A plier type tool, especially of the type in which the plier jaws can be locked in adjusted closed positions and wherein the opposed surfaces of the jaws are especially configured for gripping articles of different shapes while exerting twisting effort or pulling or pushing effort on the articles.

10 Claims, 14 Drawing Figures



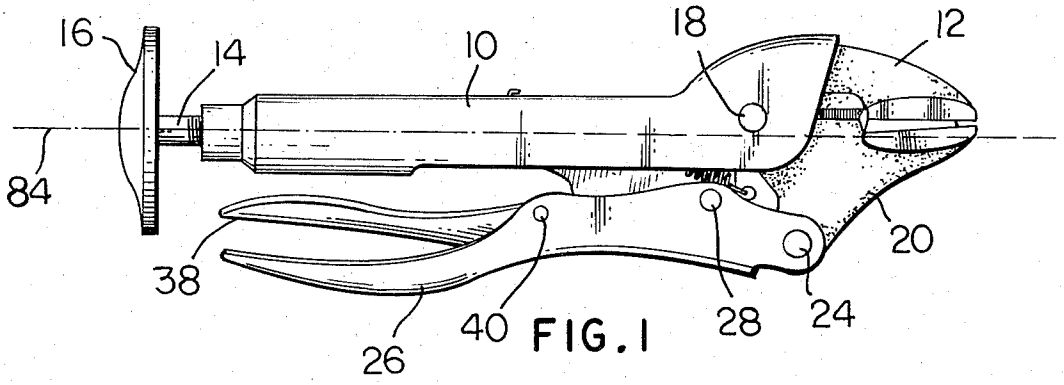


FIG. 1

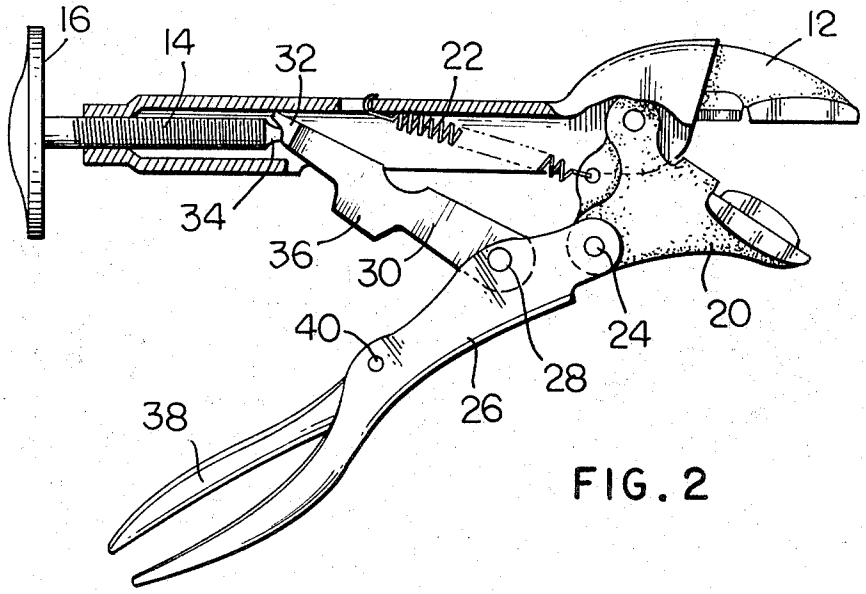


FIG. 2

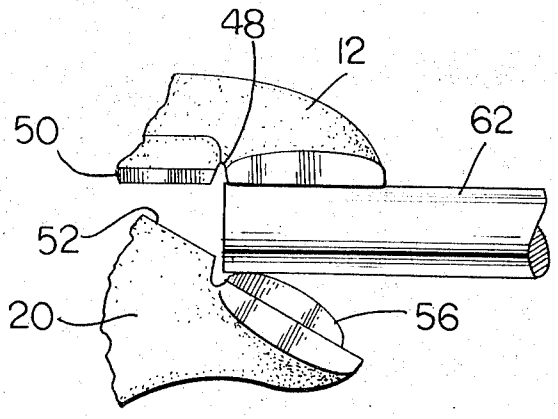


FIG. 3

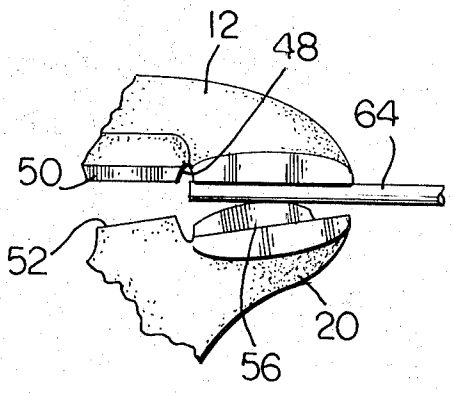


FIG. 4

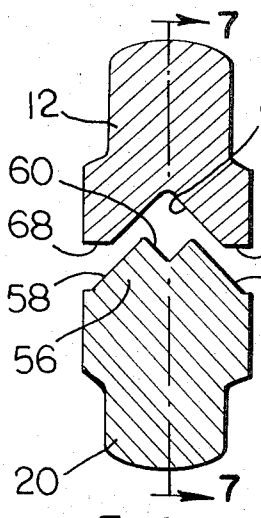


FIG. 5

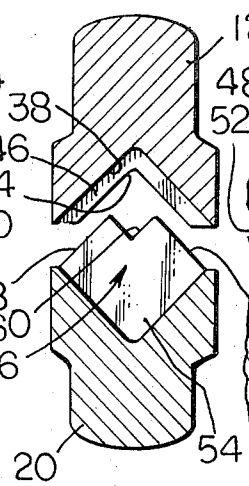


FIG. 6

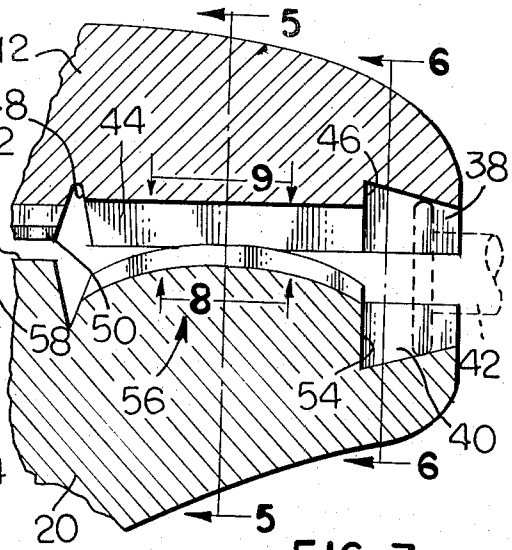


FIG. 7

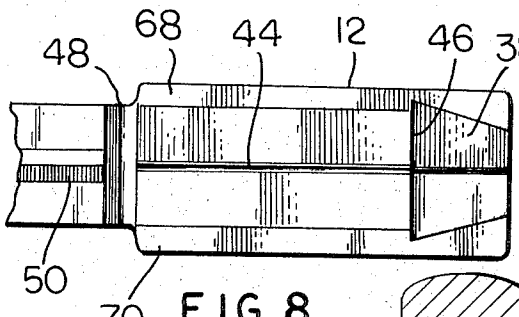


FIG. 8

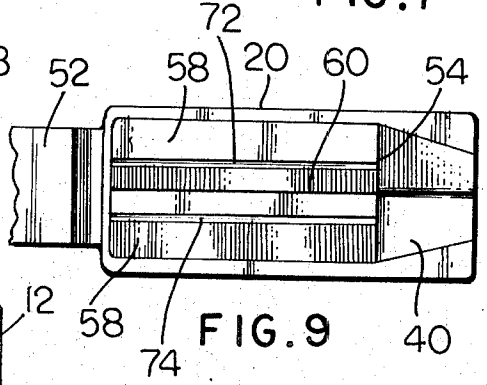


FIG. 9



FIG. 11

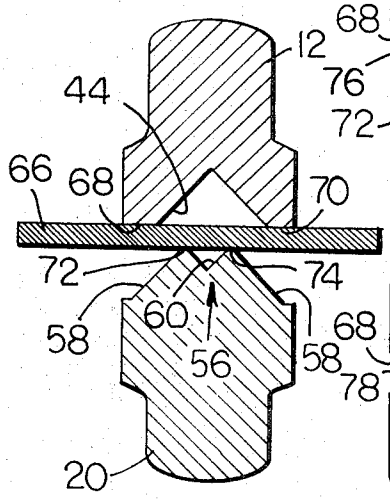


FIG. 10

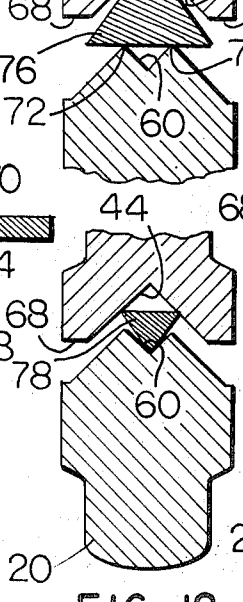


FIG. 12

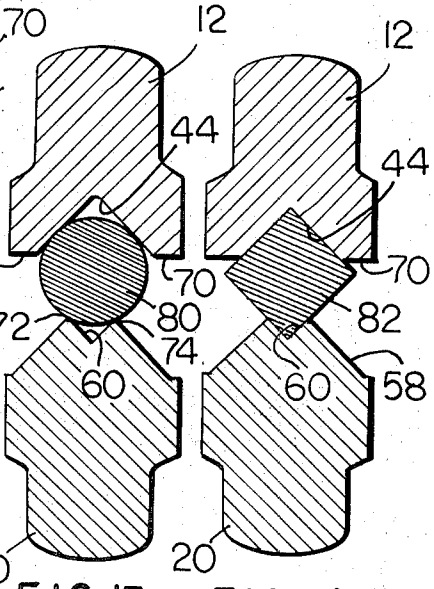


FIG. 13

FIG. 14

PLIER TYPE TOOL

The present invention relates to a plier type tool and particularly of the type of plier tool in which the jaws can be clamped in adjusted closed positions thereof.

Pliers of the type referred to are well known and include an adjustable toggle mechanism for moving the jaws relative to each other and which toggle mechanism will, upon closing the jaws, snap over center and thereby fixedly clamp the jaws in the closed position thereof.

As mentioned, such plier type tools are well known, but heretofore have had relatively simple jaw configurations and have been somewhat limited in utility.

With the foregoing in mind, a primary objective of the present invention is the provision of a plier type tool of the nature referred to in which the jaws are especially configured to provide firm gripping action on work pieces of various shape.

Another object is the provision of a plier type tool of the clamping type in which the jaws are configured so that the tool can be employed as a handle for manipulating other tools such as files, drills, reamers, burring tools, taps or the like.

Another object is the provision of a tool of the nature referred to adapted for pushing and pulling or twisting operations in which the main handle of the tool is offset in such a manner that the line of action of pushing and pulling or twisting forces exerted on the handle always remains within the confines of the jaws of the tool.

A still further object of the present invention is the provision of a plier type tool of the nature referred to which has the jaws so configured as to enable the jaws to take a very close grip on articles which must be withdrawn from an object, such as broken drills and taps.

A still further object is the provision of a plier type tool of the nature referred to in which the jaws, while having special configurations for special purposes, can still be employed in the normal clamping and squeezing operations that regular pliers perform.

The foregoing objects as well as still further objects and advantages will become more apparent upon reference to the following detailed specification taken in connection with the accompanying drawings in which:

FIG. **1** is a side elevational view of a plier type tool according to the present invention with the jaws in closed position.

FIG. **2** is a view like FIG. **1** with the jaws in open position and with the tool partly in section.

FIG. **3** is a fragmentary view showing the jaws in widely opened position gripping a rod-like member.

FIG. **4** is a fragmentary view showing the jaws in nearly closed position and gripping a rod-like member smaller than the one shown in FIG. **3.**

FIG. **5** is a sectional view indicated by line **5—5** on FIG. **7** showing the configuration of the jaws of the tool at one point therealong.

FIG. **6** is a view like FIG. **5** and is indicated by line **6—6** on FIG. **7** and shows the jaw configuration at another point therealong.

FIG. **7** is a sectional view indicated by line **7—7** on FIG. **5** showing the jaws in longitudinal cross section and in nearly closed position.

FIG. **8** is a plan view looking in at the working face of one of the jaws and is indicated by line **8—8** on FIG. **7.**

FIG. **9** is a view like FIG. **8** but looking in at the working face of the other jaw and is indicated by line **9—9** on FIG. **7.**

FIG. **10** is a view similar to FIG. **5** but showing a flat plate-like member gripped between the jaws.

FIG. **11** is a fragmentary view similar to FIG. **10** but showing the manner in which a triangular member of larger size can be gripped by the jaws.

FIG. **12** is a view like FIG. **11** but shows how a triangular member of smaller size can be gripped by the jaws.

FIG. **13** shows the jaws gripping a circular member.

FIG. **14** shows the jaws gripping a square member.

BRIEF SUMMARY OF THE INVENTION

A plier like tool according to the present invention comprises a first handle member having a jaw element fixed thereto at one end. Another jaw element is pivoted on the handle near the aforementioned one end thereof and a toggle mechanism is provided between the handle and the pivotally supported jaw member for actuating the jaw member toward and away from each other. The toggle mechanism is adjustable to vary the closed position of the jaw members and snaps over center when the jaw members reach the adjusted closed position thereof so that the jaw members are fixedly clamped in the adjusted position.

According to the present invention, one jaw has a groove of a certain size extending longitudinally thereof commencing from the outer end and the other jaw member has a smaller groove extending longitudinally thereof in a protuberant portion which is arcuate when viewed from the side so as to eliminate the necessity of a multiple position pivot when gripping either large or small objects and which, when viewed from the end, has flanks receivable inside the groove in the first mentioned jaw portion.

In the extreme outer ends of the jaw portions, recesses are formed which are in opposed relation and which taper inwardly toward the free outer ends of the jaw members thereby providing a recess in which screw heads and nail heads and the like can be received and very firmly gripped.

The arrangement for adjusting the toggle is in the form of a screw extending into the rear end of the main handle and this screw preferably has a palm washer fixed thereto for exerting force on the tool.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings somewhat more in detail, the tool shown in FIGS. **1** and **2** comprises a main handle member **10,** of heavy sheet metal, for example, which has fixed thereto at one end a first jaw member **12.** At the other end of the handle **10** there is a threaded aperture in which an adjusting screw **14** is threaded which has on its outer free end the rounded palm washer **16.**

A pivot pin **18** extends through handle **10** near the back end of jaw member **12** and pivotally mounted thereon is a moveable jaw member **20.** Moveable jaw member **20** is biased toward open position by a tension spring **22** which will be seen in FIG. **2.** Jaw member **20** has a portion projecting therefrom and pivoted thereto by pivot pin **24** is a lever **26.**

Lever **26** is also pivotally connected at **28** with an arm **30** that extends upwardly into the slotted lower side of handle **10** and has an end portion **32** somewhat

cup shaped in configuration and engaging the somewhat rounded inner end **34** of adjusting screw **14.**

Arm **30** has a protuberant portion **36** engageable by a release lever **38** pivotally connected to lever **26** at **40** which is usable, in a conventional manner, for releasing the tool from closed position.

The exact position that jaw member **20** will occupy relative to jaw member **12** when lever **26** is in its FIG. **1** position is determined by the adjustment of screw **14.** In FIG. **1,** the jaw members are substantially fully closed but rotation of screw **14** will permit the lever system consisting of lever **26** and arm **30** to snap over center with the jaw **20** spaced a substantial distance from jaw **12.**

As will best be seen in FIGS. **5** through **9,** upper jaw member **12** is formed with a region near the outer free end which is in the form of a right angle notch, indicated at **38,** the juncture of the legs of which is at the top and which tapers inwardly toward the free end of jaw **12.**

Jaw **20** is formed with a correspondingly shaped but inverted recess **40** and these recesses cooperate, as indicated in FIG. **7,** to form an arrangement whereby a nail or screw head, as indicated at **42,** can be gripped by the tool for exerting a pull on the tool, or whereby a short protruding length of nail or screw or a broken tap or drill can be gripped by the tool for removal thereof from an object.

Rearwardly of recess **38,** jaw member **12** is formed with a further linear right angle notch **44,** the juncture of the legs of which is also at the top and at the right end of which, as viewed in FIG. **7,** there is a shoulder **46** which is at the rear end of recess **38** and which faces toward the outer free end of the jaw members while at the rear end of groove **44** is a recess **48** which can also be engaged over a nail head or screw head or the like.

Rearwardly of recess **48,** jaw member **12** is provided with one part of a substantially conventional plier type cutting device in the form of a blade **50** adapted for engaging the anvil or further cutting blade portion **52** on jaw member **20** and directly opposed to knife edge **50.**

Jaw member **20** also has a forwardly facing shoulder **54** at the back end of recess **40** and rearwardly therefrom is a region **56** of about the same length as notch **44** in jaw member **12** and converges toward notch **44.** The region **56,** as will best be seen in FIG. **5,** has side flanks **58** receivable inside notch **44** while along the peak of region **56** there is a smaller notch **60** also preferably a right angle notch with the juncture of the legs in the lowermost position.

The utility of the plier tool according to the present invention may be appreciated upon reference to FIGS. **3, 4** and **10** through **14.** In FIG. **3,** the jaw members **12** and **20** will be seen to be engaging a rod-like member **62** in gripping relation thereto. The upper part of the rod-like member is engaged in groove **44** of jaw member **12** and the lower part is engaged by the top of arcuate region **56** of jaw member **20.**

In FIG. **4,** a substantially smaller rod-like member **64** is similarly gripped between the jaw members **12** and **20,** and it will be seen that, due to the arcuate configuration of region **56,** both the larger and smaller rod-like members can be firmly gripped between the plier jaws, although only a single pivot point is required and due to the alignment of handle and jaws, as previously mentioned, a substantially concentric axis is formed through the handle and the piece being gripped regardless of the diameter. Thus, this arrangement together with the palm plate allows for easy twisting or push-pulling or lever action of the parts being held.

FIG. **10** shows how a flat plate-like member **66** can be grippingly engaged between jaws **12** and **20** by being engaged by the upper jaw by regions **68** and **70** on the upper jaw which are flat and which extend longitudinally therealong at the side edges of the groove **44** in the upper jaw member. On the underside, the member **66** is gripped by the peaks **72** and **74** therealong the region **56** of the lower jaw member which occur at the junctures of flanks **58** of the region **56** with the sides of the notch **60** formed in the top of region **56.**

FIG. **11** shows how a triangular member of fairly large size, indicated at **76,** can be gripped between the jaw members by presenting one flat side of the triangular member downwardly for engagement by the peaks **72** and **74** previously referred to on the lower jaw member while an apex of the triangular member is engaged by the notch **44** in the upper jaw member at the bottom of the said notch.

FIG. **12** shows a similar arrangement except that the triangular member **78** is substantially smaller and in this case it is of advantage to place an apex of the triangular member in the bottom of groove **60** and to permit the other apices of the triangular member to be engaged by the sides of notch **44** in jaw member **12.**

FIG. **13** shows a circular work member **80** gripped between the jaws, and it will be seen that the sides of notch **44** on jaw **12** are engaging peripherally spaced points of the work member while the peaks **72** and **74** previously referred to engage space points on the underside of the circular member.

FIG. **14** shows a rectangular work member **82,** and the upper side thereof is engaged in notch **44** of upper jaw member **12** while the lower side is engaged in notch **60** of lower jaw member **20.**

It will be apparent that the configuration of the opposed faces of the jaw members of the tool according to the present invention are adapted for firmly gripping a wide variety of shapes and that a close bite can be taken on a variety of workpieces by the recesses at the outer free ends of the jaw members while articles gripped between the jaw members can be pushed and pulled, pushing of such gripped objects being facilitated by the provision of the rounded palm member **16** on the end of the screw **14.**

In respect of pushing and pulling or twisting or lever type operations, reference may be made to FIG. **1,** wherein the dashed line **84** indicates the axis of screw **14** and which dashed line will be seen to be disposed on the side of jaw member **12** which faces jaw member **20.** Due to this offset position of handle **10,** and which is a novel feature of the present invention, the line of action of a twisting or reciprocating or lever type force applied to the pliers, by way of palm plate, screw **14** and other portions of the handle and by way of the curved member **16,** will always fall within the confines of a work member gripped between the jaw members.

In respect of the recesses **38** and **40,** it will be appreciated that, inasmuch as these recesses taper inwardly toward the outer free ends of the jaw members, when the jaw members are finished off flat on the ends as will be seen in the drawings, the recesses have relatively sharp edges which will facilitate the gripping of objects thereby. Further, the inside of the cavity formed by the

opposed recesses is also advantageously provided with serrations in the form of fine vertical grooves.

The configuration of the recesses, together with the grooves referred to, enables the jaws to take a very close bite on articles, while at the same time, the article is forced into the cavity rather than outwardly therefrom so that the tool does not easily slip off an article and twisting and bending operations can be performed thereon.

What is claimed is:

1. A locking type plier tool having a first and second jaw element in opposed relation with free forward ends and pivotally interconnected near the rear ends, a pair of handle members operatively connected to said jaw elements for movement of the jaw elements in closing direction toward each other and in opening direction away from each other, means for adjusting the spacing between the jaw elements in closed position thereof, means for locking the jaw elements in closed position, said first jaw element having a longitudinal first groove on the side facing said second jaw element, said second jaw element provided with an elongated arcuate shaped protuberant portion having lateral flanks adapted to be receivable inside the first groove, and said protuberant portion having a longitudinal second groove for cooperating with the first groove whereby a workpiece of different configurations can be clamped thereby.

2. A locking type plier tool according to claim **1** in which the first jaw element is provided with a longitudinal first notch at the forward end which registers with said first groove and said jaw element is provided with a longitudinal second notch at the forward end which registers with said second groove.

3. A locking type plier tool according to claim **1** in which the said jaw elements are provided with a recess therein rearwardly of the first and second grooves to provide a space to receive an enlargement on the end of a member gripped between said jaw elements.

4. A locking type plier tool according to claim **2** in which the said first and second grooves are V-shaped and said first and second notches diverge toward said first and second grooves respectively and with the apices of said first and second grooves disposed in a common plane.

5. A locking type plier tool according to claim **1** in which said second groove at the open side is narrower than said first groove at the open side.

6. A locking type plier tool according to claim **1** in which said first groove is V-shaped in cross section and the lateral flanks of said protuberant portion are substantially parallel to the side surfaces of said first groove.

7. A locking type plier tool according to claim **2** in which said first and second notches taper inwardly in the forward direction at the forward ends of said jaw elements.

8. A locking type plier tool according to claim **6** in which the rearward ends of the tapered regions of said first and second notches comprise forwardly facing shoulders.

9. A locking type plier tool according to claim **1** in which said means for adjusting the closed position of said jaw elements includes a screw extending in the fore and aft direction and threaded into the end of one of said handle members at the end thereof opposite said jaw elements and protruding in the rearward direction from the handle member, and a palm plate of substantial diameter fixed to the protruding end of said screw.

10. A locking type plier tool according to claim **9** in which said one handle member in which the screw is threaded is fixedly connected to one of said jaw elements, the axis of said screw being offset from the said one side of said one jaw element toward the other jaw element.

* * * * *