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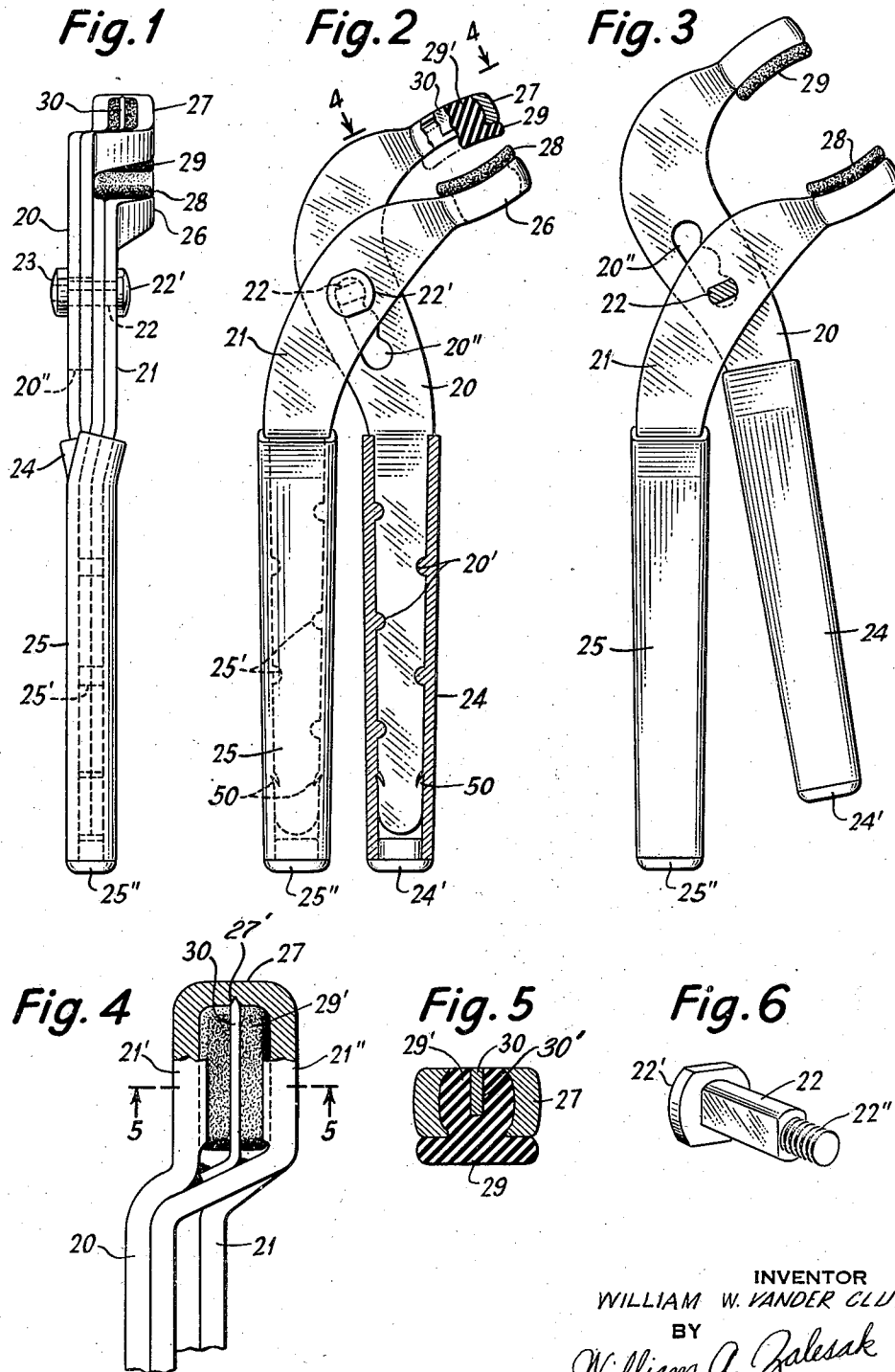
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2,488,484

PLIERS HAVING INSULATED JAWS AND HANDLES

Filed May 30, 1944

2 Sheets-Sheet 1



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Fig. 7

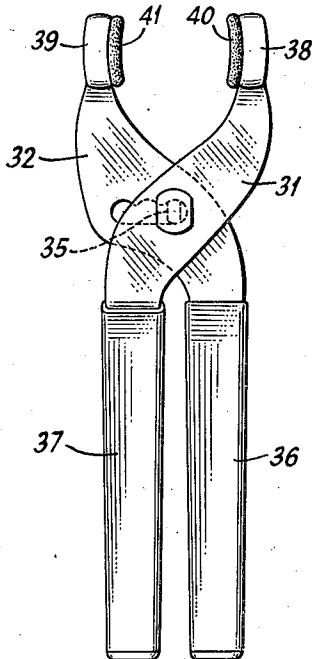


Fig. 9

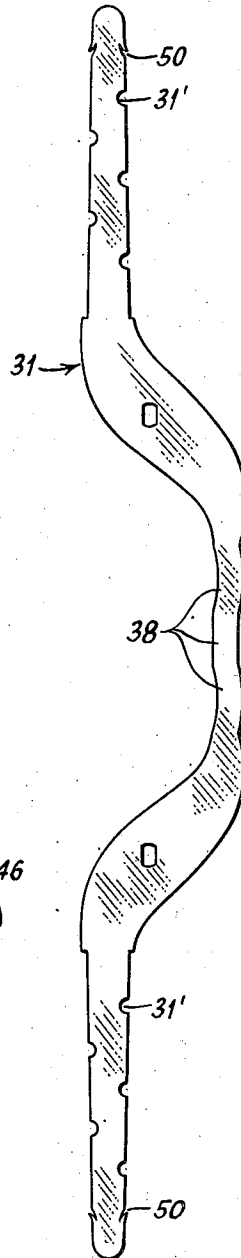


Fig. 10

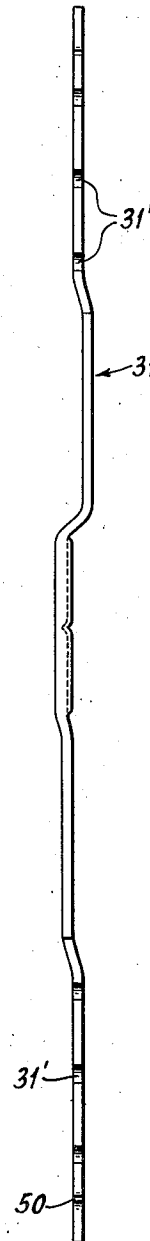


Fig. 8

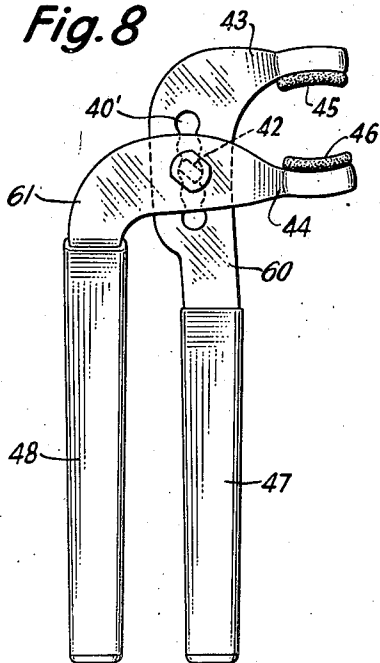
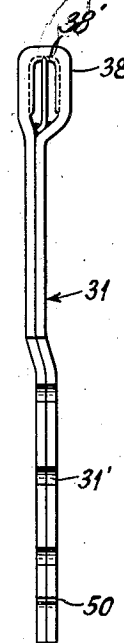


Fig. 11



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My invention relates to tools, more particularly to gripping tools such as pliers and wrenches.

In certain types of work, for example in aircraft, assembly work where aluminum or other soft metal and materials are used, elements with easily marred or injured surfaces must be engaged firmly to insure rotation when a turning force is applied without injury to the element. In many applications the tool must be thoroughly insulated against electrical shock. It is also desirable that such tools be made easily, quickly and cheaply, but be sturdy and effective for their intended applications. It is also highly desirable to insure a positive grip by a device which can be easily and quickly adjusted to take different size work.

It is an object of my invention to provide an improved tool for gripping and rotating elements worked upon.

It is another object of my invention to provide such a tool which reduces to a minimum or substantially eliminates marring or damage to surfaces although insuring a substantially positive gripping action.

Another object of my invention is to provide a quickly, easily and cheaply made tool of the kind described, preferably of laminated sheet metal construction involving merely blanking and forming, also thus reducing waste.

It is another object of my invention to provide such a tool which is easily adjustable and having replaceable work gripping elements.

A still further object of my invention is to provide a novel method of manufacturing a tool of the kind described.

These and other objects will appear hereinafter.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims, but the invention itself will best be understood by reference to the following description taken in connection with the accompanying drawing in which Figure 1 is a side view of a device made according to my invention, Figure 2 is a plan view of the device shown in Figure 1, Figure 3 is another plan view with the device adjusted to take different size work, Figure 4 is an enlarged detail projected into the plane 4-4, of a gripping jaw and a removable insert, Figure 5 is a transverse section taken along the line 5-5 of Figure 4, Figure 6 is a perspective showing details of construction of a pivot pin made according to my invention, Figures 7 and 8

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show modifications of a tool made according to my invention, and Figures 9 to 11 illustrate steps in the preferred method, according to my invention, of making the above described tools.

In Figures 1 and 2 I show a tool made according to my invention and comprising a pair of handle members 20 and 21 made of laminated sheet metal material blanked and formed to shape. The element 20 is provided with an apertured portion 20' through which the pivot pin 22 extends, having a nut 23 to retain the pin in place. The handles are provided with insulating covering elements 24 and 25 made of insulating material such as plastic molded on, or formed and later slipped on as described in greater detail below.

The gripping ends of the handles are provided with a pair of loop-shaped jaws 26 and 27 on which are mounted the replaceable gripping elements 28 and 29, preferably of some soft material such as a soft metal, resilient elements such as rubber, synthetic rubber or a plastic resistant to oil, water, gasoline or salt water.

The details of the jaws are shown in Figures 4 and 5. It will be noted that the handle 21 comprises two laminated portions and is provided with a loop having a pair of oppositely disposed sides 21' and 21'', and in the center of which is positioned the element or central web 30 received within a slot 30' in the gripping member 29. The member 29 is provided with a portion received between the oppositely disposed concave surfaces 21' and 21'' of the gripping jaw. If the handle is made of two parts, they may be welded together or each handle may be fabricated as described below. The concave surfaces of the two outer portions 21' and 21'' of the loop provide a cavity to hold and lock in place the gripping element or lip tip 29. The element 30 serves as an insert stabilizing member and prevents the gripping elements from being forced out of the confining sides of the gripping jaws, one end of this element being positioned in the groove 27' of the jaw 27 and the other end being welded to the handle as shown in Fig. 4.

The pin is shown in greater detail in Figure 6. It is provided with a head 22' and threaded end 22'' for receiving nut 23. Opposite flat sides are provided as shown and when mounted on the pliers as shown in Figures 2 and 3, the flat sides of the pin are at a 45° angle to the plane of the adjusting circular notches, permitting stress due to lever action being transmitted to the circular notches on both sides of the plane passing

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through the adjusting slot to provide a non-slipping action desirable particularly when gripping jaws are at or near 90° of the center line of the pliers.

Two methods of fabricating the tool may be used.

A plastic hand grip may be molded in two parts and then pressed on the end of the hand levers provided with notches fitted into the serrations described above to position and retain the grips and prevent the grips from being forced off the end of the hand levers. The plastic grips may be welded together and bonded to the steel hand levers by means of liquid plastic. These plastic hand grip members are shaped to fit the palm of the hand. A preferred handle is described below.

In Figure 7 is shown a modification of a tool made according to my invention and comprising two handle members 31 and 32 pivoted at 35 and having insulated handles 36 and 37, the gripping jaws 38 and 39 being provided with the resilient gripping pads on inserts 40 and 41.

The device shown in Figure 8 allows the tool to be used exactly as a wrench but has the additional advantage of plier lever action.

Handle members 60 and 61 are pivoted together by means of the pivot member 42 having the straight sides at a 45° angle to the plane parallel to the longitudinal axis of the apertured portion 40' of member 40. The handles are provided with gripping jaws 43 and 44 at 90° to the handles and are provided with gripping pads 45 and 46 and the insulating handles 47 and 48.

The preferred method of making my invention is illustrated in Figures 9 to 11, inclusive. In the first step the pliers are blanked out in one piece from flat stock as shown in Figure 9, the serrations, spurs and apertures being formed at the time of blanking, the apertures being smaller than those in the finished article.

The blanked out portion is then placed in forming dies and offset as shown in Figure 10, the portion which provides the loop being formed with a concave surface and a notch for receiving the partition extending across the loop in the finished tool. The two portions of the handle member are then folded toward each other with the partition or tongue 30 placed within the loop prior to closing the two parts of the handle upon each other, the tongue being gripped between the notch 33' at the end of the loop and the two sides of the loop as shown in Figure 11. At this stage the final curves or offsets are provided in the tool. The parts are then welded at the points indicated by spot welding. The adjustment apertures are then perforated to final diameter, after which the tool is polished and plated to prevent rust. The two halves may then be assembled together in pivoted relationship with the nut and bolt extending through the apertures.

In the preferred embodiment of my invention, the handles 20 and 21 are provided with a plurality of notches or serrations 20' and 25' and with catch-burrs or spurs 50 to retain in place the handle members 24' and 25''. These handle covers may be formed from various kinds of flexible material, such as thin synthetic rubber or plastic tubing and having a cross section conforming with the section of the steel handles. The steel handles may be dipped in a solvent and the plastic tube forced on the handle, stretching the tube to give it a tight fit. The serrations act as cups, retaining a solvent which hardens

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and locks the covers to the handles. The spurs act as additional means for retaining the tubes or covering of the handles and preventing slipping. The tubes project a short distance beyond the end of the steel handle and a molded end cap, such as 24'' or 25'', may be inserted into the end of the plastic tube after it has been dipped in the solvent which welds or fuses the cap to the plastic tube, making a rigid finish for the tube. This end cap may be of contrasting color with respect to the tube for identification purposes and for appearance. The plastic tubular cover is forced on the steel handle and positions itself with respect to the offsets of the steel handle and as the offsets are at different angles to each other the plastic tube follows these different angles and results in a finished tool in which different angles form a natural block which prevents the hand from sliding forward off the handle portion of each handle member, and also acts for better gripping by the hand.

While I have indicated the preferred embodiments of my invention of which I am aware and have also indicated only one specific application for which my invention may be employed, it will be apparent that my invention is by no means limited to the exact forms illustrated or the use indicated, but that many variations may be made in the particular structure used and the purpose for which it is employed without departing from the scope of my invention as set forth in the appended claims.

What I claim as new is:

1. A tool for gripping and rotating a work piece and having a pair of pivoted elements, each of said elements including at one end a loop and a central web extending across said loop, a gripping element received within said loop and provided with a slot, said web being located in said loop the ends of said web being in contact with said loop and secured at one end to said loop.
2. A tool for gripping and rotating a work piece and having a pair of pivoted elements providing at one end oppositely disposed jaws, each of said jaws comprising a loop, a centrally positioned partition extending across said loop, and having its ends in contact with said loop and secured at one end to said loop the oppositely disposed surfaces of said loop being concave, and a yieldable gripping element received within said loop and provided with a slot receiving said partition, said gripping element being retained by said loop under pressure by the sides of said loop.
3. A tool for gripping a work piece and having a pair of pivoted elements, each of said elements comprising a plurality of sheet metal formed elements, one end of the sheet metal elements being formed to provide a loop, a central web within said loop, and having its ends in contact with said loop and secured at one end to said loop and a resilient gripping element received within said loop and provided with a slot receiving said web, said gripping element being retained within said loop under pressure from the sides of said loop.
4. A tool for engaging material to be gripped and held against relative rotation, said material having smooth or irregular surfaces, said tool including a pair of relatively pivotable members each provided with a gripping jaw oppositely disposed to the gripping jaw of the other member, each jaw comprising a loop having oppositely disposed concave sides and a partition extending across said loop and having its ends in contact

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with said loop and secured at one end to said loop and a yieldable insert having a gripping surface and mounted within said loop and provided with a slot receiving said partition.

5. A tool for gripping and rotating a work piece and having a pair of pivoted elements, each element having flat portions and at one end being provided with a jaw, each of said jaws comprising a loop offset with respect to the flat portions of the element, and a central web extending across said loop having its ends in contact with said loop and secured at one end to said loop, and a gripping element received within said loop and provided with a slot receiving said web.

6. A tool for engaging material to be gripped and held against relative rotation, said material having smooth or irregular surfaces, said tool including a pair of relatively pivotable members each provided with a handle portion and a gripping jaw oppositely disposed to the gripping jaw of the other element, each jaw comprising a loop having oppositely disposed concave sides and a web extending across said loop and having its end in contact with said loop and secured at one end to said loop, and a yieldable insert having a gripping surface and mounted within each loop and provided with a slot receiving said web, said yieldable insert being maintained in said loop under pressure, said gripping jaws being mounted at a 90° angle to said handle portion.

7. A tool for gripping a work piece and having a pair of pivoted members, each member being formed from flat stock, each member including

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a handle terminating in a loop, said loop having a groove at one end, a web extending across said loop and having one end in said groove and the other end secured to said loop, a yieldable gripping element received within said loop and provided with a slot receiving said web, said loop having oppositely disposed concave sides on opposite sides of said web, said element being retained by said loop under pressure by the sides of said loop.

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