

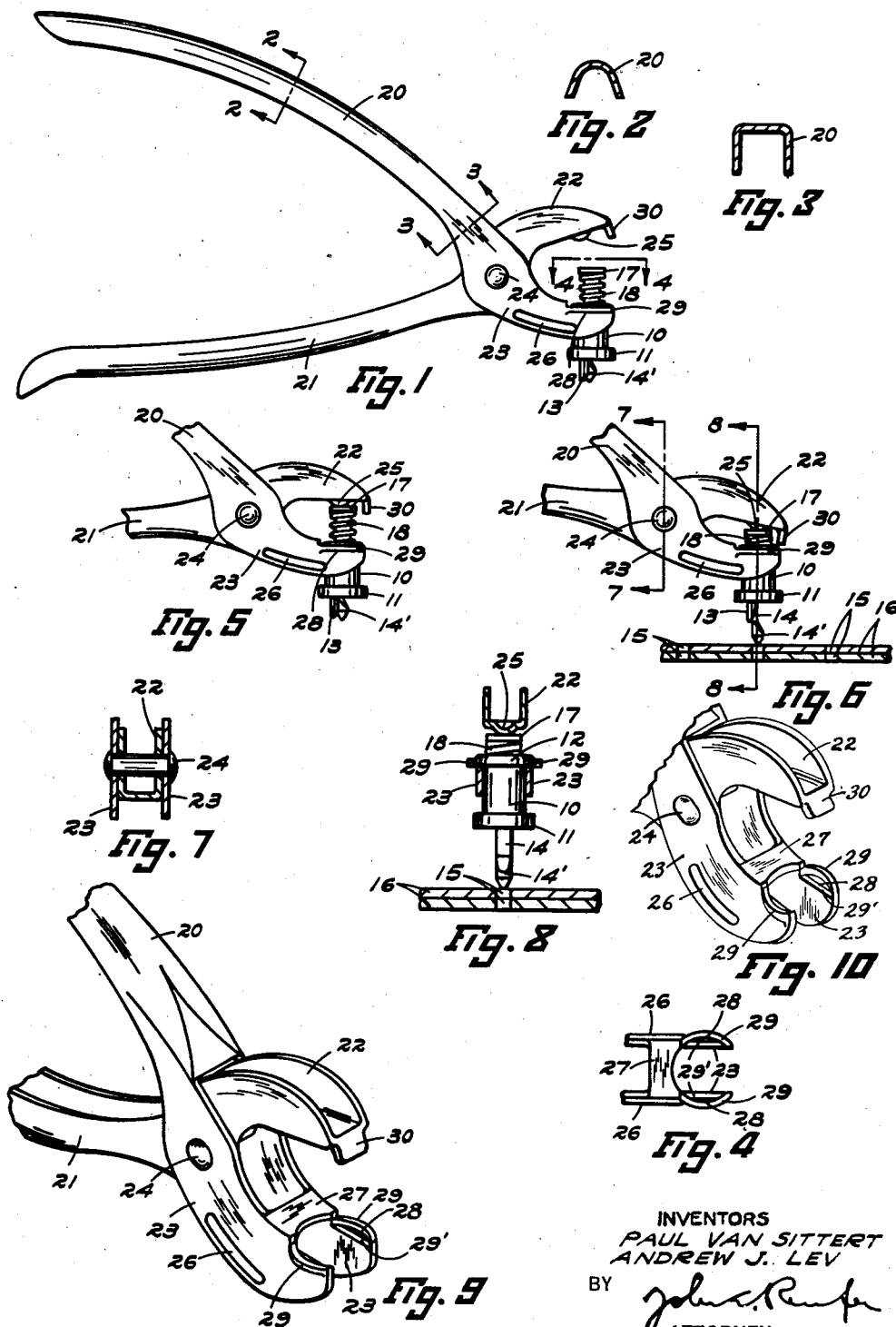
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2,328,866

PLIERS

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2,328,866

PLIERS

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This invention relates to improvements in pliers for plate holders. Small spring clamps, called plate holders, are in wide use in the airplane industry for holding metal plates together during riveting operations, such holders being described and claimed for example in U. S. Patent No. 2,136,875. In the fabrication of airplanes two plates that are to be riveted together, after the rivet holes are drilled, are positioned in the desired relation with their rivet holes registering, after which plate holders are inserted in some of the registering holes to clamp the two plates together while rivets are being set in the remaining holes, and then the holders are removed and the remaining rivets are inserted and set. The pliers of the present invention are designed for inserting and removing the plate holders.

One of the objects of the invention is the provision of pliers for the purpose indicated which shall be of simple construction adapted to quantity production at relatively low cost.

Another object is the provision of pliers of the type described embodying means for preventing a holder from snapping out of place after or during the operation of the pliers to compress the holder spring. The holder springs are relatively heavy and if a holder is inadvertently released while the spring is compressed it will snap out of the pliers with considerable force and may cause bodily injury to a workman. It is an object of the present invention to prevent such accidents.

Other objects and features of novelty will appear as we proceed with the description of that embodiment of the invention which, for the purposes of the present application, we have illustrated in the accompanying drawing, in which Fig. 1 is a side view of a pair of pliers embodying the invention, the pliers being shown in open position with a plate holder inserted.

Figs. 2 and 3 are cross-sectional views taken substantially on the lines 2—2 and 3—3 respectively of Fig. 1.

Fig. 4 is a plan view of the split jaw of the pliers, looking in the direction of arrows 4—4 of Fig. 1.

Fig. 5 is a fragmental view similar to Fig. 1 with the jaws partially closed.

Fig. 6 is another similar view with the jaws completely closed and the spring compressed to the extent necessary to permit certain parts of the holder to be inserted into registering rivet holes.

Figs. 7 and 8 are cross-sectional detail views on a somewhat larger scale, the views being taken

substantially on the lines 7—7 and 8—8 respectively of Fig. 6.

Fig. 9 is a fragmental perspective view of the pliers on a still larger scale.

Fig. 10 is a fragmentary perspective view of the pliers and more clearly illustrates the manner in which the lower jaws are fabricated.

As shown in the drawing a plate holder in connection with which our novel pliers are to be employed is illustrated as comprising a cylinder 10 terminating at its lower end in a base plate 11 which may project more or less beyond the periphery of the cylinder proper. The upper end of the cylinder has a collar 12. The base plate 11 has an opening therethrough adjacent which it carries a depending finger 13 which is crescent shaped in cross section as shown in the above mentioned patent. A plunger projects through a hole in base 11 adjacent finger 13 and has a shank 14 of such cross section that together with finger 13 it is adapted to fill registering rivet holes 15 in a pair of plates 16 to be joined together. The shank 14 has a circular foot 14' of a size which will permit it to slide through holes 15, the upper part of the foot being bevelled on one side. The shank 14 with its foot 14' constitutes the lower end of the plunger which projects through the cylinder 10 and has a head 17 at its upper extremity. A coil spring 18 surrounds the plunger and bears at its lower end against base plate 11 and at its upper end against the head 17 of the plunger. When the head 17 is pushed downward relatively to the cylinder, as in Figs. 6 and 8, the foot 14' will be caused to pass through aligned rivet holes, after which the finger 13 and shank 14 may also be caused to extend through the holes, permitting the base 11 to engage the surface of the upper one of the two plates 16. Then when the operator relieves the pressure upon spring 18 the plunger will be drawn upwardly and the bevelled face on the foot 14' will engage one edge of the hole 15 in the lower plate 16 and will pull the plates together against the base 11 of the holder. The foregoing construction and its operation are well known in the art and form no part of the present invention.

The pliers which are the subject of this invention may be conveniently constructed of stampings, and comprise two handles 20 and 21. A jaw 22 on the end of handle 21 is straddled by a split jaw 23 on the end of handle 20, and these two elements of the pliers are connected by a pivot 24. Jaw 22 is provided with a small semi-spherical boss 25 adapted to provide substantially

a one point bearing upon the head 17 of the plunger of a holder.

The vertical walls of the split jaw 23 are generally flat, but may have reinforcing ribs 26 formed therein if desired. The walls of this jaw are laterally spaced to receive between them rather snugly the cylinder 10 of a holder, and to reinforce them they may be joined by a bridge 27, as indicated in Figs. 4 and 9. Beyond the bridge 27 these walls, during the fabrication of the tool, are formed with longitudinally extending slits 28 therein which fall short of the free longitudinal ends thereof and leave near the upper ends of the walls as best shown in Fig. 10, narrow segments 29 that are curved outwardly to fit around the collar 12 of a holder and to embrace the collar beyond the axis of the holder. The upper ends of the vertical walls below the segments 29 form a pair of parallel longitudinally extending seats 29' for the collar 12 of a holder. In other words, the material is cut for a portion of its length and the separated part is curved outwardly to form the segments 29, there being a space between said segments and the seats 29' identified as the slit 28.

When a holder has been put in position with its cylinder 10 between the flat walls of the split jaw 23 and with its collar 12 resting upon the seats 29' and the periphery of its collar embraced by the annular segments 29, the holder can not be removed by an outward motion alone, that is to say it must first be raised to enable the collar 12 to clear the segments 29 before the holder can be withdrawn from the split jaw of the pliers. Hence, when a holder is in place and the spring 18 has been compressed it is impossible for the holder to snap out of place.

As an additional safety measure we provide a guard lip 30 on jaw 22 to overhang the plunger head 17 of a holder and thus provide further

means for preventing the snapping of the holder out of the pliers, particularly in the event that the holder is not properly set within the split jaw before the spring is compressed.

Obviously, the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all of the features of the invention be used conjointly, since they may be employed advantageously in various combinations and subcombinations.

Having thus described our invention, we claim:

1. A pair of pliers for inserting and removing plate holders comprising, pivoted upper and lower jaws, said upper jaw adapted to engage the head of the plunger of a holder and said lower jaw to engage the cylinder of the holder beneath the collar thereof, said lower jaw including a pair of spaced vertical walls, the upper end of each of said vertical walls being longitudinally split for a portion of its length and the area of said walls above said split being outwardly curved to form segmental shaped portions for engaging said collar outwardly of the holder axis.

2. A pair of pliers for inserting and removing plate holders comprising, pivoted upper and lower jaws, said upper jaw adapted to engage the head of the plunger of a holder and said lower jaw to engage the cylinder of the holder beneath the collar thereof, said lower jaw including a pair of spaced vertical walls, the upper end of each of said vertical walls being longitudinally split for a portion of its length to form a strip-like seat for the collar of the holder, and the area of the walls above said seats being outwardly curved to form segmental shaped portions for engaging said collar outwardly of the holder axis.

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