July 24, 1956 M. E. KRUGER 2,755,541

PLIER TOOL FOR APPLYING AND REMOVING SHEET METAL FASTENERS

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Fig. 1.

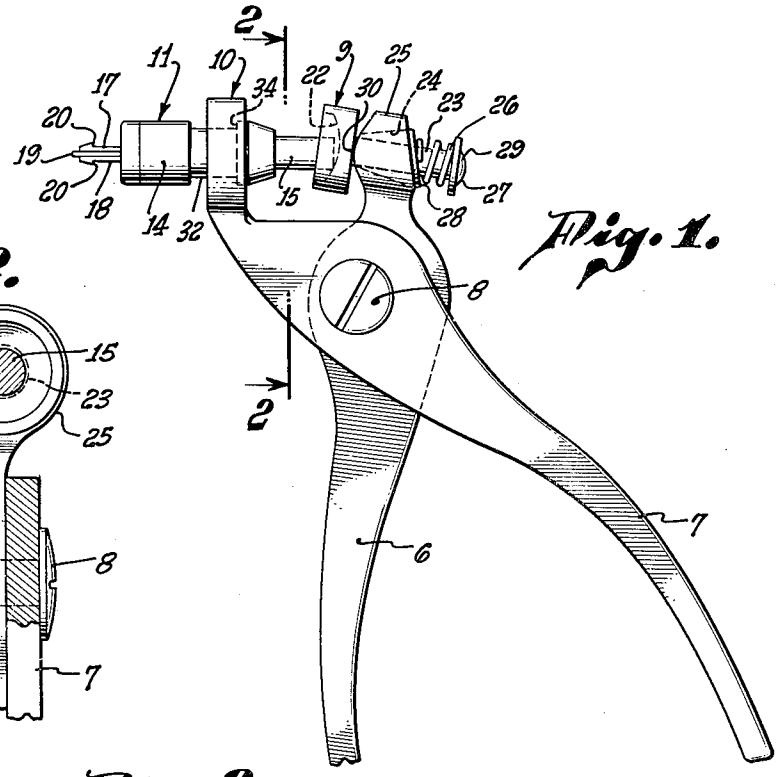


Fig. 2.

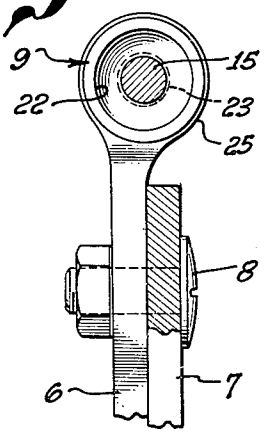


Fig. 3.

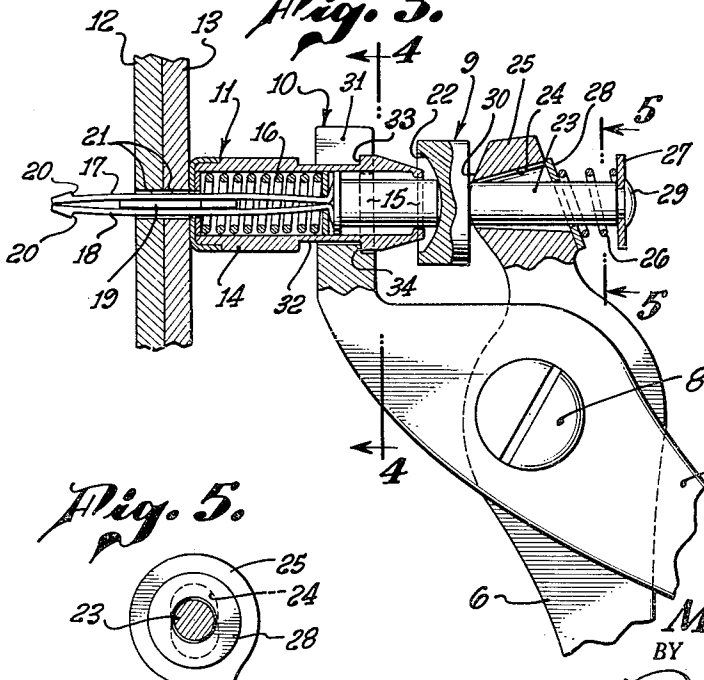


Fig. 4.

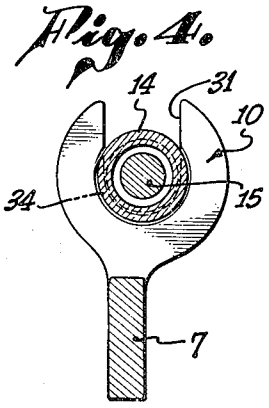


Fig. 5.

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PLIER TOOL FOR APPLYING AND REMOVING SHEET METAL FASTENERS

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3 Claims. (Cl. 29—268)

This invention relates to tools for applying and removing fasteners for temporarily holding sheet metal members in position to facilitate the riveting or other fastening thereof.

In sheet metal fabrication, particularly in aircraft construction, it is the practice to apply spring-loaded fasteners such as described, at intervals in rows of rivet holes, to hold the sheet metal members in proper position for riveting. Each of these fasteners is provided with clamping jaws which are movable between a position permitting insertion thereof through the rivet holes and a position for clamping the sheets together, the clamping action being effected by spring means. A plunger is provided in the body of the fastener for moving the jaws against the action of the spring means, into position for insertion through the rivet holes. When the plunger is released the jaws are moved by the spring means, to clamp the sheets together.

Plier-like tools as heretofore used for applying and removing such fasteners are objectionable in that they impose strains on the fastener due to the jaws moving arcuately than in line with the plunger. This arcuate movement of the plier jaws causes the fastener jaws and the body of the plunger to bind against one another, thereby making it difficult to apply the fastener and causing wear and distortion, which in time renders the fastener unfit or unsafe for use.

It is an object of this invention to provide a tool of the character described by means of which sheet metal fasteners may be easily and accurately applied and removed without the aforementioned objections or damage of the fasteners.

It is another object of this invention to provide a tool of the character described having a self-aligning jaw which applies a force in a direct line with the plunger to obviate binding, wear and other objections occasioned in tools as heretofore used.

It is a further object to provide a plier-like tool of the character described having an improved mounting means for one of the tool jaws, whereby the tool may be quickly, easily, and safely operated to set and remove the sheet metal fasteners.

It is another object of this invention to provide in a tool such as described, a means for resiliently holding a jaw on one of the handles of the tool in a manner permitting relative movement between the jaw and the handle, in the operation of applying and removing the sheet metal fasteners, whereby an easier operation of the tool is assured without jamming, distorting or damaging the fastener.

This invention possesses many other advantages and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown one form in the drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description

is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Fig. 1 is a side elevation of a tool embodying the present invention, shown as applied to a sheet metal fastener preliminary to the application of the fastener to sheet metal members;

Fig. 2 is a sectional view, taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged, sectional view, partly in elevation, showing the tool and fastener in the position in which the fastener will clamp the sheet metal members together upon release of the plunger, this also being the position for effecting removal of the fastener;

Fig. 4 is a sectional view, taken on line 4—4 of Fig. 3; and

Fig. 5 is a sectional view, taken on line 5—5 of Fig. 3.

Referring to the accompanying drawing, it will be seen that a tool embodying this invention generally comprises a pair of crossed handles 6 and 7 pivoted where crossed as at 8 and provided with opposed jaws 9 and 10.

The jaws 9 and 10 are operable for engaging and operating a sheet metal fastener 11 in a manner for applying it to and removing it from sheet metal members 12 and 13, for example as shown in Fig. 3.

The fastener 11, as here shown, is typical of fasteners in general use and comprises a tubular body member 14 in which a plunger 15 is slidable against the action of a spring 16, to extend a pair of pin-like jaw members 17 and 18 outwardly from the body, away from a spreader member 19 stationarily mounted on the body between the jaw members. Normally the jaw members 17 and 18 are retracted by the spring 16, so that the outer ends thereof having clamping shoulders 20 thereon, are spread apart by the spreader member 19, as shown in Fig. 1. As these jaws are resilient, when the outer ends thereof are extended beyond the spreader member 19, they will move toward one another, whereby the jaws may be inserted through aligned rivet holes 21 in the sheet metal members 12 and 13, as shown in Fig. 3. Upon release of the plunger 15, the spring 16 retracts the jaws 17 and 18, so that the sheet metal members 12 and 13 will be clamped between the clamping shoulders 20 and adjacent end of the body 14 of the fastener.

In accordance with this invention the jaw 9 of the plier tool, is adapted to engage and move the plunger 15 for applying and releasing the fastener 11, and is mounted on the handle 6 in a manner providing for such relative movement between the jaw and the handle, that a straight line thrust is directed axially of the plunger, throughout the full movement of the jaw and handle, thereby preventing a binding and distorting action, as well as objectionable wear and damage of the fastener.

Accordingly, the jaw 9 is mounted so that a relative rocking movement between it and the handle 6 on which it is mounted, will take place upon operation of the tool to apply and remove the fasteners, thereby making the jaw 9 self-aligning with the plunger.

For this purpose the jaw 9 has a concave face 22 for contacting and centering the jaw on the plunger and is provided with a projecting member or shank 23 which is extended through a slot 24 in the end portion 25 of the handle 6. The shank 23 supports a coil spring 26 tensioned between a washer 27 fixed to the outer end of the shank and a similar washer 28 held by the spring against the end portion 25 of the handle 6. The washer 27 is riveted, as at 29, or otherwise secured on the shank 23 after the shank has been inserted through the slot 24 and the washer 28 and spring 26 have been placed on the shank. The back of the jaw 22 is biased by the spring 26 against a rounded, or fulcrum portion 30 on the end 25 of the handle 6, whereby relative movement between the portion 25 and the jaw 9 will take place

when depressing the plunger. The slot 24 is tapered so as to be enlarged in a direction away from the rounded portion 30, whereby the shank 23 will rock therein to permit of relative movement between the end portion 30 and the jaw 22 in accordance with this invention.

The jaw 10, as here shown, is integral with the handle 7 and is bifurcated, as at 31, to receive and hold the fastener 11, with the plunger 15 in position to be engaged by the jaw 9. The body 14 of the fastener 11 is provided with a circumferential groove 32 forming a shoulder 33 adapted to contact an inwardly offset arcuate shoulder 34 on the jaw 10, in a manner for holding the fastener in the jaw against displacement outwardly therefrom when moving the plunger 15. These shoulders are disengaged and the fastener removed from the tool by moving the fastener axially towards the rockable jaw 9, then outwardly from the jaw 10.

When the fastener is in place in the tool, as shown in Fig. 1, with the outer end of the plunger 15 seated in the concave face 22 of the jaw 9, the plunger will be depressed against the action of the spring 16 upon appropriate manipulation of the handles 6 and 7 of the tool, thereby extending the jaws 17 and 18 so that they may be inserted through the aligned holes 21 in the members 12 and 13, as shown in Fig. 3. With the fastener positioned as shown in Fig. 3, the plunger is released and the spring 16 will retract the jaws 17 and 18 so that the members 12 and 13 will be clamped between the jaw shoulders 20 and the adjacent end of the fastener body 14. Removal of the fastener is effected by applying the tool thereto and depressing the plunger as shown in Fig. 3, then removing the fastener while so held in the tool.

In moving the plunger for applying and removing the fastener, the protuberant portion 30 on the end 25 of the handle 6 will rock upon the back of the jaw so that the jaw will transmit a force against the plunger in a straight line, axially of the plunger throughout the full movement of the jaw and handle, thereby preventing binding between the plunger and the fastener body and eliminating wear and possible damage as heretofore occasioned in using plier tools having the jaws fixed on the handles.

Thus, the tool of this invention not only prevents undue wear and damage of the fasteners, thereby giving them longer life for repeated safe use, but provides for a quicker application and removal of the fasteners with less effort.

I claim:

1. In a plier tool for applying and removing sheet metal fasteners, a pair of pivotedly connected handles, a fastener-supporting jaw on one of said handles, a second jaw for contacting and moving a movable part of said fastener, a shank fixed to said second jaw, the other of said handles having an opening through which said shank extends, said other handle having a protuberant fulcrum portion surrounding said opening and on which said second jaw is rockable, a coiled spring on said shank, and means on said shank tensioning said spring to hold said jaw against said fulcrum portion, said opening being dimensioned to permit said shank to rock with said second jaw relative to said other handle.

2. In a plier tool for applying and removing sheet metal fasteners, a pair of pivotally connected handles, opposed jaws mounted on said handles, one of said handles having an opening therein and a fulcrum portion surrounding one end of said opening, one of said jaws being rockable on said fulcrum portion, a member fixed to said one jaw projecting through said opening for rocking movement therein relative to said one handle, and a resilient element on said projecting member engaging said one handle to hold the back of said one jaw against said fulcrum portion.

3. A plier tool for applying and removing a sheet metal fastener having a pair of relatively movable parts, comprising: a pair of pivotally connected handles; a jaw on one of said handles constructed and arranged to engage one of said parts to support the fastener; a second jaw having a concave surface for engaging the other part of said fastener; and means mounting said second jaw for rocking movement on the other of said handles while the second jaw is engaged with the other part of said fastener; said last named means including a substantially flat surface on said second jaw and a protuberant fulcrum portion integral with said other handle; a shank on said second jaw; said other handle having an opening extending through said protuberant fulcrum portion; said shank being disposed in said opening; said opening being dimensioned to permit said shank to rock therein when said second jaw is rocked; and a resilient element on said shank engaging said other handle and urging said substantially flat surface into contact with said fulcrum portion.

References Cited in the file of this patent

UNITED STATES PATENTS

92,331	Mason	July 6, 1869
448,451	Miller	Mar. 17, 1891
1,334,965	Ridings	Mar. 30, 1920
2,086,400	Brenizer	July 6, 1937
2,328,866	Van Sittert et al.	Sept. 7, 1943
2,339,397	Helbush	Jan. 18, 1944
2,352,722	Lipp	July 4, 1944

FOREIGN PATENTS

10,217	Great Britain	June 2, 1900
284,992	Germany	June 15, 1915