June 17, 1952 F. L. GRAHAM 2,601,117

APPLYING AND REMOVING EXTENSION DEVICE FOR TEMPORARY RIVETS

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Fig 1.

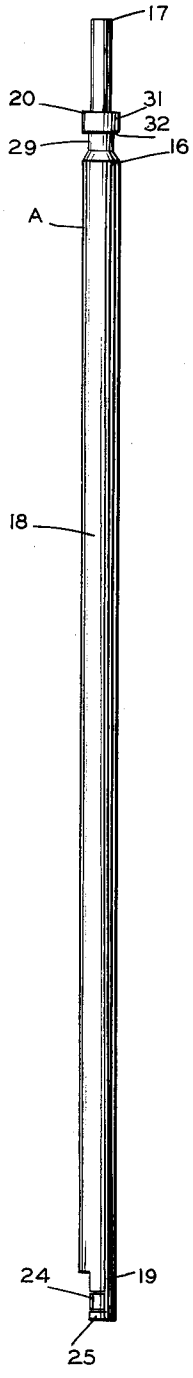

Fig 2.

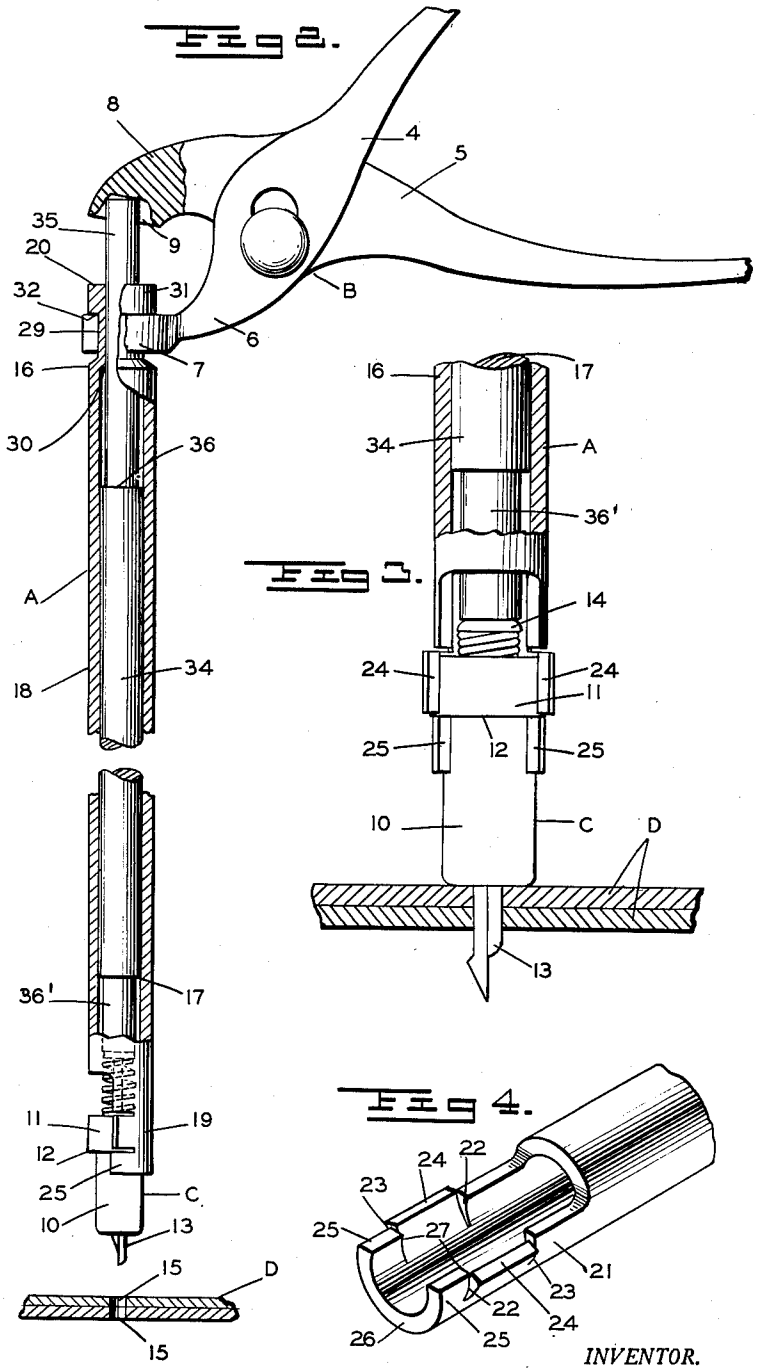

Fig 3.

Fig 4.

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APPLYING AND REMOVING EXTENSION DEVICE FOR TEMPORARY RIVETS

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2 Claims. (Cl. 29—283)

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This invention relates to hand manipulable tools, and more particularly to an applying and removing extension device for temporary rivets used in holding together perforated sheets, or perforated sheets and struts with their perforations in alignment, preparatory to riveting them or the like.

Temporary rivets of this character are on the market and have long been used for the purpose specified. Examples of rivets of this type are shown in United States Patents 2,136,875, granted November 15, 1938, 2,159,655, granted May 23, 1939, and 2,266,929, granted December 23, 1941. Those most commonly used in the United States each comprises a tubular body for engagement with one face of the perforated plates, the body having an enlargement providing a circumferential shoulder adapted to be engaged by the bifurcated jaw of a plier-like hand tool shown in said Patent 2,136,875; a detent means carried by the body and extending from one end thereof, to be engaged with the opposite face of the other perforated plate; and a spring operated plunger reciprocable in the tubular body for operating the detent means, this plunger being engaged by the other jaw of the hand tool when placing or removing the rivet.

This combination of temporary rivet and hand tool has been found very satisfactory for general use, the plier-like tool being inexpensive, comparatively light in weight, and efficient in operation when the zones where the rivets are to be placed or removed, are at arm's length, or less, from those places accessible to the workmen.

In a large part of work, especially aircraft repair, this arm's length limit of operation means inaccessibility and often involves the expenditure of hundreds of dollars and many man-hours labor just to remove obstructions or tear into ships from the outside to reach restricted areas and permit workmen to reach the repair job. In addition to this, costly equipment, such as aircraft, is "laid-up" for a considerable length of time while the tearing down and reconditioning is taking place.

The principal object of this invention is to provide an extension device which may be easily and quickly used with these types of temporary rivets and hand tools of the general nature referred to, whereby the rivets may be placed and/or removed without the expense and delay above referred to if the zone of operation is out of arm's reach.

Another object is to provide extension devices of the character described, which are low in cost of manufacture and which may be made in various lengths to satisfy the requirements in various types of factories and repair shops or stations.

Other objects and advantages will appear in

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the following detailed description of a highly satisfactory embodiment of my invention, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing:

Fig. 1 is a side elevational view of the extension device.

Fig. 2 is an enlarged fragmentary detail view, partly in side elevation and partly in vertical section showing the extension device to which is detachably connected a hand tool of the plier-like type, and a temporary rivet in readiness to be placed in retaining relationship to two perforated plates.

Fig. 3 is a similar view on a larger scale, partly in front elevation and partly in vertical section, showing detent means of the rivet extending through the perforations of the plates.

Fig. 4 is a fragmentary perspective view of one end portion of the extension main body portion.

In the drawing, A designates the extension device, B a suitable hand tool of the plier-like type, C a suitable type of temporary rivet which may be used with the extension device and D, plates to be held together by the rivet C.

The hand tool, old in the art, is shown as comprising two pivotally connected levers 4 and 5, a jaw 6 of lever 4 being bifurcated as at 7 and a jaw 8 of lever 5 having a socket 9 for engagement with a part of the rivet C.

The rivet C is shown as comprising a short tubular body 10 having a circumferentially extending flange or enlargement 11 providing a shoulder 12, which is normally engaged by the bifurcated end 7 of the hand tool jaw 6 when the hand tool is applied directly to the rivet; detent means 13 extending from one end of body 10; and a spring operated plunger 14 reciprocable in the body 10 for operating the detent means in any suitable or approved manner, the plunger 14 normally extending from the other end of body 10. In practice, when the hand tool B is in direct operative relation to the rivet, the upper end of plunger 14 is received in the socket 9 of jaw 8, and the jaw 6 is arranged in embracing relation to the body 10 and in engagement with shoulder 12. Upon moving the levers 4 and 5 toward each other the plunger 14 is depressed and the detent means 13 is projected so that it may be inserted through perforations 15 in plates D, with the end of the body 10 engaging the face of one of the plates. When the plunger 14 is permitted to resume its normal position, by relieving pressure on the levers 4 and 5 of the hand tool B, the detent means 13 firmly engages the face of the other plate.

Referring now to the extension device A, it comprises a hollow rod 16 and a plunger rod 17 reciprocable therein.

The hollow rod comprises a relatively long tubular body 18 and relatively short reduced end

portions 19 and 20. The end portion 19 is constructed and arranged to function as a coupling means for detachable connection with the rivet C and in the example shown is made by reducing the cross section of the stock from which body 18 is made by cutting away laterally, preferably less than one half thereof, leaving stock 21 of substantially U-shaped cross section, so that the rivet may be received in the extension device laterally of its axis. The stock 21 is provided with longitudinally spaced, circumferentially extending slits 22 and 23 at each side, providing arms 24 and 25 extending from each side of a bight portion 26 as shown in Fig. 4. The arms 24 are bent to a permanently set position to diverge outwardly from the bight portion, so as to accommodate the enlargement 11 of the rivet C. The arms 25 thus provide shoulders 27 for engagement with the shoulder 12 and also embrace the body 10 of the rivet C when it is forced laterally in place with the axis of plunger 14 in substantially axial alignment with the axis of hollow rod 16. The end portion 20 is reduced in diameter to provide a collar-like formation 29 providing an internal annular shoulder 30 facing toward the end portion 19, and is provided with an external flange 31 at its free end portion providing a shoulder 32 also facing toward the end portion 19. Thus the collar-like formation accommodates the bifurcated jaw 7 of the hand tool B with its arms engaging the shoulder 32 as shown in Fig. 2.

The plunger rod 16 is, in the example shown, made from rod stock and turned or otherwise treated to comprise a relatively long body portion 34 and a relatively short reduced end portion 35 providing a shoulder 36. The portion 34 is of a length to extend from adjacent the juncture of end portion 19 of the hollow rod 16, when the plunger rod is assembled to extend therein, to adjacent the shoulder 30, and the portion 35 extends through the reduced end portion 20 of hollow rod 16 to a point beyond the free end of such portion 20, as shown in Fig. 1. If desired the other end of rod 17 may also be slightly reduced in diameter to provide a relatively short end portion 36' to enter the body portion of temporary rivets of the type shown in the aforesaid Patent 2,159,655, where the spring operated plunger does not extend beyond the end of the rivet body.

The shoulders 30 and 36 prevent the plunger rod 17 from being withdrawn from the hollow rod 16 at the end portion 20 of the latter, and the plunger rod 17 may have a snug fit in the hollow rod 16, so that it will not readily slide from the latter at its end portion 19 if held in the position shown in Figs. 1 and 2.

The operation of the extension device A is as simple as its construction. The rivet C is pressed into the coupling portion 19 where it is firmly gripped. The hand tool B is then applied to the end portion 20 and pressure applied to the levers 4 and 5 in the usual way. Thus the plunger rod 17 operates the plunger 14 of the rivet to condition the detent means 13 for insertion through the perforations 15 of the plates D. Releasing pressure on the levers 4 and 5 results in firm gripping relation of the work by the rivet, and disengagement of the extension device from the rivet requires only a light tipping and lateral pressure applied to the extension device. Removal of the rivet is just as simple, the procedure being the reverse of that described for placing the rivet.

While I have herein referred to the unit C as a "temporary rivet" it is to be understood that this unit, sometimes referred to as a "sheet metal fastener," "coupling," "clamp device," etc. may of course be placed to hold parts together and left in place, if access cannot readily be had to the zone for the substitution of ordinary rivets, bolts, screws and the like.

I claim:

1. An extension device for applying and removing temporary rivets, comprising a hollow rod having a relatively long tubular body portion, and relatively short first and second reduced end portions, said first end portion being of substantially U-shaped cross section adapted to receive the rivet laterally of the axis of said rod and being provided with resilient arms for embracing relationship with the rivet, and said second reduced end portion of collar-like formation providing an internal annular shoulder facing toward said first end portion, and being provided with an external flange at its free end portion providing a shoulder facing toward said first end portion; and a plunger rod reciprocable in said hollow rod, said plunger rod having a relatively long body portion extending from adjacent said first end portion to adjacent said shoulder of the hollow rod, and a relatively short reduced portion extending through said second reduced end portion of the hollow rod and to a point beyond the free end of said last mentioned end portion.

2. An extension device for applying and removing temporary rivets, comprising a hollow rod having a relatively long tubular body portion and two end portions, one end portion being a relatively short reduced end portion of substantially U-shaped cross section adapted to receive the rivet laterally of the axis of said rod, and being provided with a bight portion and resilient arms intermediate the length of said reduced end portion and diverging outwardly from said bight portion and having side faces, for embracing relationship with a portion of the rivet, said bight portion having a pair of shoulders facing toward said side faces for abutting another portion of said rivet, the other end portion being of collar-like formation providing an internal annular shoulder facing toward said one end portion and having an external flange providing a shoulder facing toward said one end portion, and a plunger rod reciprocable in said hollow rod, said plunger extending with one end thereof at a point in said hollow rod inwardly of said arms to a point beyond the other end of the hollow rod and through said other end portion, said plunger having an external shoulder engageable with said internal shoulder.

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