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ANGLE RIVETER ATTACHMENT

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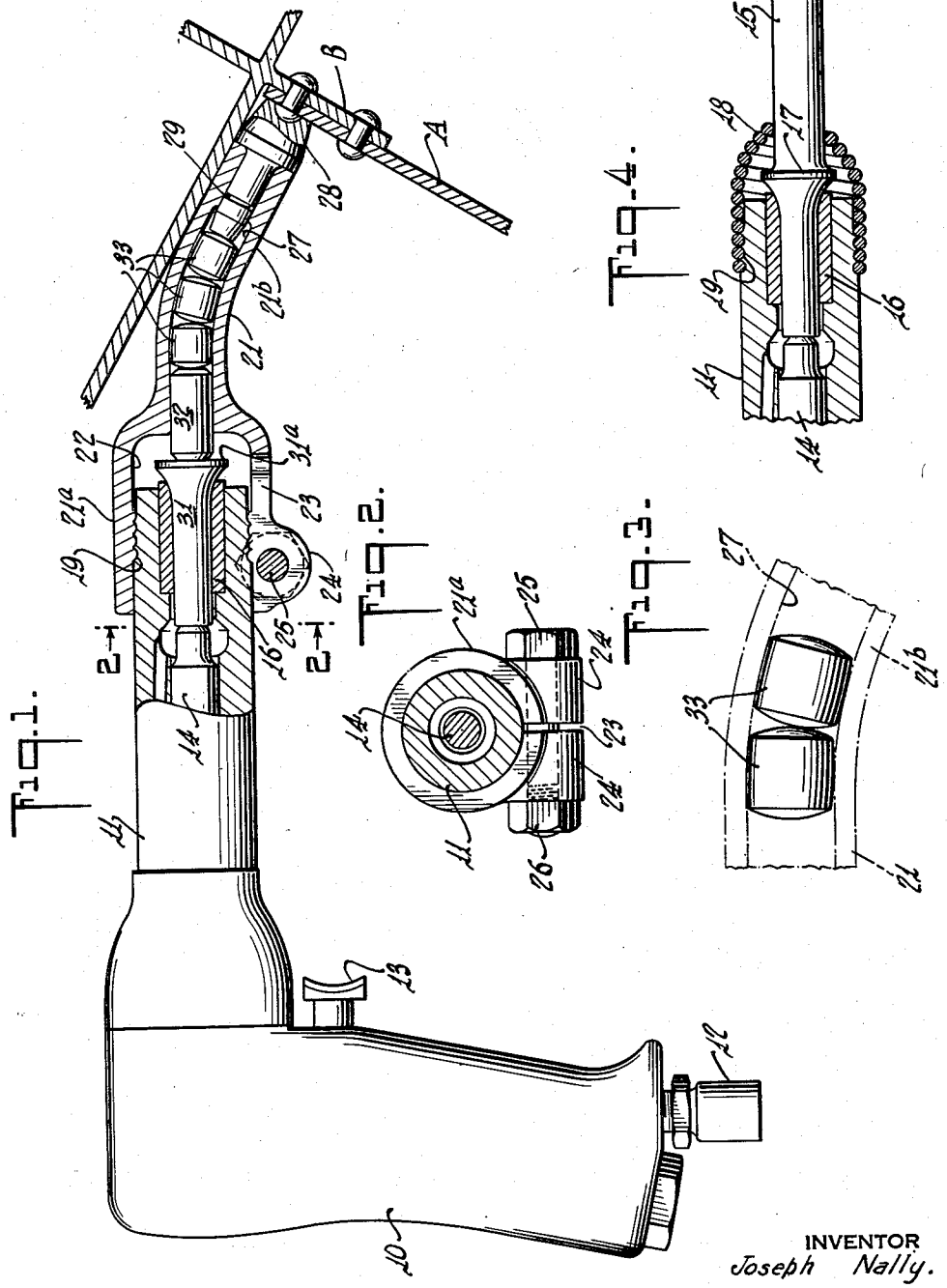


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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ANGLE RIVETER ATTACHMENT

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4 Claims. (Cl. 78—49)

This invention relates generally to percussive tools and more particularly to an attachment for such tools which enables impacts, delivered by a hammer piston, to be transmitted along a line curved out of the axial path of the piston.

The device of the invention has particular value as an attachment for riveting tools since conditions frequently arise in riveting operations in which a straight line riveting tool can not be brought into alignment with a rivet and, in delivering its blows at an angle, forms an imperfect head on the rivet. In transmitting impacts along a line curved out of the axial path of the hammer piston, the device of the invention permits the riveting tool to be held at an angle with respect to the axis of the rivet and yet deliver its blows along a line coincident with the axis of the rivet.

The invention is embodied in an attachment which may be mounted upon a tool of conventional construction and comprises broadly a curved tubular casing, or cylinder extension, containing a train of impact transmitting anvil blocks.

An object of the invention is to enable a riveting hammer or similar tool to operate in close quarters.

Another object of the invention is to enable blows delivered by a hammer piston to be transmitted along a line curved out of the axial path of the piston.

A further object is the transmission of blows along a line coincident with the axis of an impact receiving element from an impact delivering means held at an angle with respect to the impact receiving element.

Other objects and structural details of the invention will be apparent from the following dedescription when read in conjunction with the accompanying drawing, wherein:

Fig. 1 is a view, partly in elevation and partly in longitudinal section, of a riveting tool having the attachment of the present invention mounted thereon;

Fig. 2 is a cross sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged detail view of two of the anvil elements positioned within the curved tubular casing of the invention; and

Fig. 4 is a fragmentary view, in longitudinal section, of the front end of a conventional riveting tool to which the invention may be applied.

The device of the present invention is adaptable for use with a variety of percussive tools and is disclosed herein as attached to a riveting hammer of a type in general use in the aircraft industry. As shown in Fig. 1, this hammer is a small portable tool which is held in the hand of the operator, when in use, and applied manually to the work. The principal supporting elements of the tool are a handle 10 and a cylinder 11, secured to the handle 10 and extending at right angles thereto. Pressure fluid is admitted to the tool through an inlet 12 in the handle 10 and, upon actuation of a throttle control lever 13, is directed to the cylinder 11 to effect reciprocation of a hammer piston 14. The hammer piston, on its forward stroke, delivers an impact either directly or indirectly to a working implement supported at the front end of the cylinder 11. In Fig. 4 the usual front end construction of one type of riveting hammer is shown and it will be seen that, in this case, the working implement is a rivet set 15 the rear end of which extends into the cylinder 11 in axial alignment with the hammer piston 14, and in position to be struck directly by the piston. The rivet set 15 moves within a bushing 16, pressed into the outer end of the cylinder, and rearward movement of the rivet set is limited by a collar 17, on the set, engageable with the front end of the bushing. A rivet set retainer is provided, in the form of a coil spring 18 which encircles the outer end of the cylinder 11 and has a threaded engagement with a spiral groove 19 formed in the outer periphery of the cylinder. The front end of the coil spring 18 extends beyond the cylinder 11 and tapers inward to enclose the rivet set collar 17. Accordingly, forward movement of the rivet set is limited by engagement of the collar 17 with the outer coils of the spring retainer.

The conventional construction of Fig. 4 is representative of the customary manner in which impacts delivered by a hammer piston are transmitted to the work. It will be observed that, in such an arrangement, the rivet set 15 is guided in an axial movement, with respect to the cylinder 11, and the force of the blow delivered by the piston 14 is therefore transmitted in a straight line. So long as working conditions permit free manipulation of the tool, transmission of the impacts along a straight line is the simplest and most efficient manner in which to obtain a hammering action. However, when fastening together angle brackets of the type shown in Fig. 1, it is not always possible to aline the cylinder with the rivet. Under such conditions the straight line movement of the rivet set 15 transmits impacts to the rivet at an angle with respect to the rivet axis and considerable

care and skill must be exercised by the operator to form an adequate head on the rivet. The attachment of the invention has been developed in order that rivets which, by reason of their position in the work are difficult to reach and properly to head, may be easily and securely headed without the exercise of any greater care and skill than that required in regular straight line riveting.

Referring to Fig. 1, this attachment comprises an extension or tubular casing 21 adapted to be mounted directly on the front end of the cylinder 11. The casing 21 replaces the coil spring retainer 18 which, together with the rivet set 15, is removed from the tool preparatory to mounting the tubular casing thereon. The extension, or casing, 21 is formed with an enlarged rearward portion 21*a* and with a forwardly extending portion 21*b* which curves in the manner of a slightly bent finger out of axial alignment with the rearward portion 21*a*. Rearward portion 21*a* is formed with a bore 22, into which the front end of cylinder 11 extends, and the inner periphery of the rearward portion is threaded to engage the spiral groove 19 on the cylinder. The rear end of the casing 21 is split to form a slot 23 and has a pair of ears 24 on opposite sides of the slot (see also Fig. 2). A bolt 25 is passed through the ears 24 and forms, in cooperation with a nut 26 screwed on to one end of the bolt outside a respective ear 24, an adjustable clamp which may be loosened when mounting the tubular casing on the tool and tightened to prevent shifting of the casing while the tool is in use.

A longitudinal bore 27 extends throughout the length of forward portion 21*b* of the casing 21 and is slightly reduced in diameter at its front end to receive the shank of a riveting die 28. The head of die 28 lies outside the bore 27 and the shoulder joining the head and shank of the die may abut against the outer end of the casing 21 to limit rearward movement of the die. A split ring 29 is mounted in an annular groove on the shank of riveting die 28 and presses with a light tension against the wall of the bore 27 to prevent the die from slipping out of the casing 21 when not engaged with the work.

For the purpose of transmitting percussive impulses from the hammer piston 14 to the riveting die 28 an intermediate train of anvil blocks is provided, one end of which engages the inner end of the die and the other end of which is in position to receive impacts from the hammer piston. The blows of the hammer piston are delivered directly upon a plunger, or anvil block, 31 which replaces the rivet set 15 within the front end of cylinder 11. The outer end of the plunger 31 lies within the enlarged bore 22 in the rear of tubular casing 21 and is formed with a head 31*a* adapted to contact a shorter plunger 32 slidably mounted within the inner end of bore 27 and extending rearwardly into the bore 22. Also within the bore 27, in advance of the plunger 32 and detached from the plunger and from each other, are three anvil elements 33. The forward one of the elements 33 engages the shank of riveting die 28; the rearward one of the anvil elements engages the plunger 32; and the middle one of the elements engages, on one end, the forward element 33 and on the other end, the rearward element 33. A direct connection, without lost motion, is thus effected between the hammer piston 14 and riveting die 28. The plungers 31 and 32 are aligned with the hammer piston 14, while the elements 33 are arranged within the curved portion of the casing 21 and are constrained by the contour of the bore 27 to deflect the blow from the axial line in which piston 14 and plungers 31 and 32 lie, to a path coincident with the axis of the die 28. As is shown most clearly in Fig. 3 the anvil elements 32 and 33 have a generally barrel shaped form to prevent scoring of the wall of bore 27 and the ends of the elements are substantially oval in shape.

The manner in which a tool bearing the angle atachment is used will be evident from the example given in Fig. 1. In this example a plate A is being secured to one arm of an angle bracket B, and it is shown how the curved finger-like casing 21 is used to gain access to a rivet, in the corner of the bracket, that could not be properly headed by a conventional straight line tool. The parts are shown in this figure at the completion of a rivet heading operation.

It will be observed that, by reason of the adjustable clamp at the rear of tubular casing 21, the casing may be locked in any desired position of rotation relatively to the cylinder 11. In assembling the tool, however, the tubular casing should be screwed on to the cylinder 11 far enough to bring all the elements of the anvil block train into contact with each other. When properly assembled, a slight opening or clearance space should appear between the front end of casing 21 and the abutting shoulder on riveting die 28.

What is claimed is:

1. An attachment for riveting and like tools comprising a curved tubular casing constructed as a tool cylinder extension and having an outer work engaging end so disposed with respect to the inner end thereof as to be brought into engagement with the work by an axial movement of the tool cylinder, the inner end of said casing being enlarged to receive the forward end of the tool cylinder and formed with means for adjusting the casing to a plurality of set positions relatively to the tool cylinder, a die supported at the outer end of said tubular casing and having a shank extending into said casing, and a train of anvil elements arranged within said casing to transmit impacts to said die, said train of elements being arranged with its forward end engaging the shank of said die and with its rearward end adjacent the inner end of said casing in position to receive impacts.

2. An attachment for riveting and like tools comprising a curved tubular casing constructed as a tool cylinder extension and having an outer work engaging end so disposed with respect to the inner end thereof as to be brought into engagement with the work by an axial movement of the tool cylinder, the inner end of said casing being enlarged to receive the forward end of the tool cylinder and formed with means for adjusting the casing to a plurality of set positions relatively to the tool cylinder, a die supported at the outer end of said tubular casing and having a shank extending into said casing, a plunger extending into the inner end of said tubular casing and arranged to receive impacts, and means interposed between said plunger and the shank of said die for transmitting impacts to said die, said means acting to deflect the impacts received by said plunger from the axial line in which said plunger lies along a path coincident with the axis of said die.

3. In a riveting or like tool, the combination of a cylinder, a hammer piston reciprocable within said cylinder, an anvil block positioned within the outer end of said cylinder for receiving impacts from said hammer piston, a curved tubular casing adapted to be mounted on said cylinder as an ex-

tension thereof and having an outer work engaging end so disposed with respect to the inner end thereof as to be brought into engagement with the work by an axial movement of said cylinder, a die supported at the forward end of said tubular casing and having a shank extending into said casing, a train of anvil elements within said tubular casing and interposed between said anvil block and said die for transmitting impacts to said die, said train of elements being limited in its rearward movement by engagement of said anvil block with said cylinder, and means for adjusting said tubular casing relatively to said cylinder to take up lost motion between said anvil block and said die and to project said die a greater or lesser distance from the forward end of said casing.

4. A pneumatic riveting hammer comprising a cylinder, a hammer piston reciprocable therein, an anvil block arranged to receive impacts delivered by the hammer piston and having a collar engageable with the front end of the cylinder to positively limit rearward movement of the anvil block relative to the cylinder, an extension having its rear end secured to the front end of the cylinder, said extension having a plunger near its rear end in engagement with and in alinement with the anvil block, said extension having at its front end a riveting die, said extension being of arcuate shape near its mid portion whereby the riveting die is disposed at an obtuse angle to the plunger, force transmitting means housed within the extension and interposed between the plunger and riveting die, said force transmitting means and said plunger being substantially incompressible longitudinally whereby practically the full force of the impact on the anvil block is transmitted to the riveting die, said riveting die having a collar adjacent the front extremity of the extension, and means for adjusting the position of the extension relative to the cylinder so that a slight clearance space may be provided between the rivet die shoulder and the front extremity of the extension and whereby manual pressure on the cylinder in a forward direction holds the riveting die in contact with the work or rivet and simultaneously holds the front end of the cylinder in engagement with the collar on the anvil block.

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