

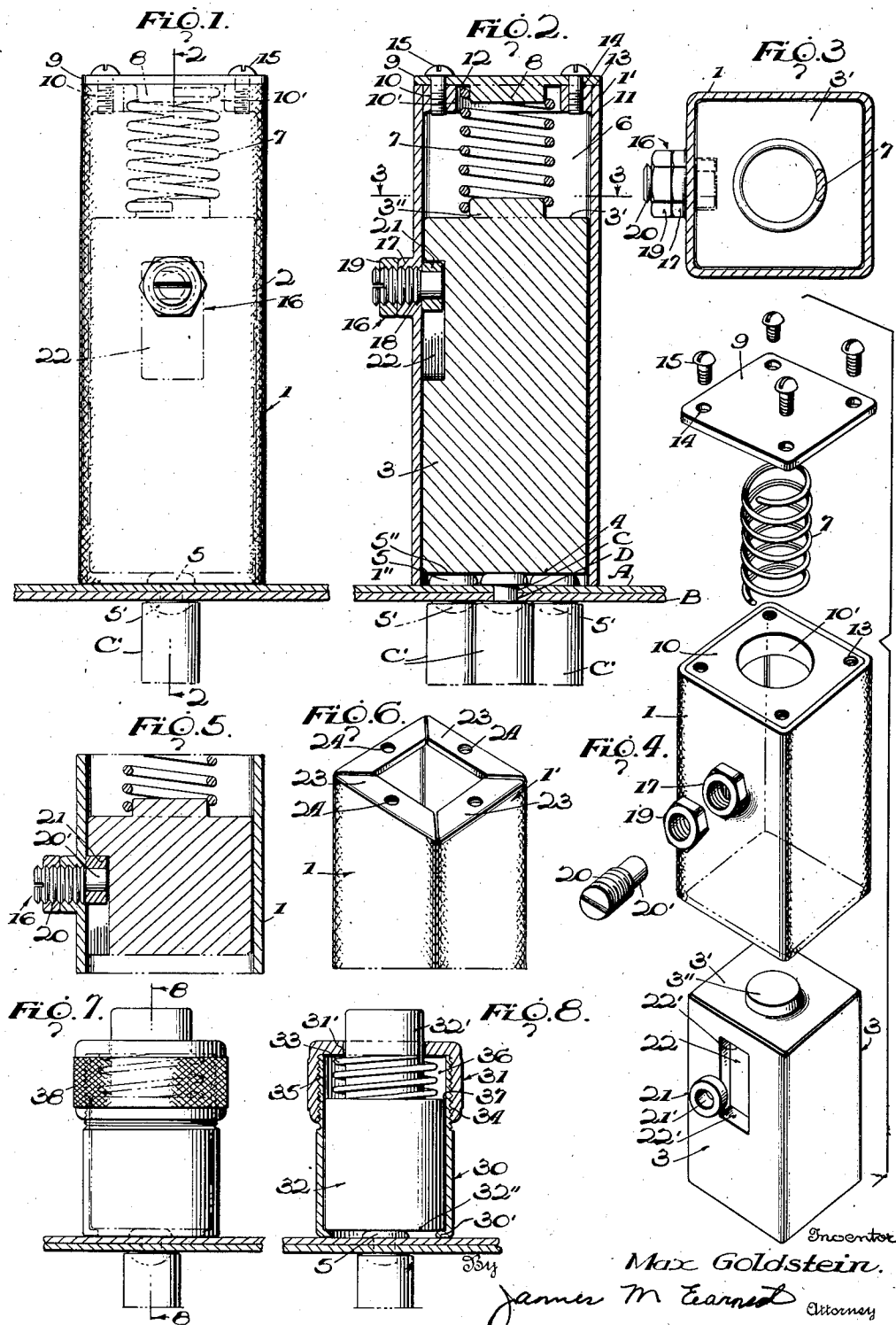
Aug. 1, 1944.

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2,354,914

RIVETING TOOL AND METHOD OF RIVETING

Filed Jan. 30, 1942



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UNITED STATES PATENT OFFICE

2,354,914

RIVETING TOOL AND METHOD OF
RIVETING

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Application January 30, 1942, Serial No. 428,969

17 Claims. (Cl. 78—53.5)

My invention relates to a riveting tool, and a method of riveting.

In the art of riveting as now practiced either of two procedures are followed: the first being to insert a manufactured rivet, consisting of a shank with a head at one end only thereof, into a proper opening in any overlapped or superimposed material such as metal sheets and the like and applying a rivet gun or equivalent means to the end of the shank opposite said head while supporting the headed end and thereby upset or otherwise deform the said shank end and forming a head thereat. The second procedure has quite recently been practiced, particularly in the aircraft industry, and consists in inserting the aforesaid rivet in an opening in any overlapped or superimposed material such as metal plates, sheets or the like and then applying a rivet gun to the head of the rivet and placing a "bucking bar," so called, against the end of the rivet shank, starting operation of the rivet gun, and thereby effect an upsetting or deformation of the shank end of the rivet to form a head thereon. This "bucking bar" is a solid metallic bar or block that is held against the shank end of the rivet by a mechanic and in use is often dislodged or slips from the shank of the rivet being "bucked" due to the intensity of the impact of the rivet gun and results in a defective "bucked" head on the shank end thereof, and this dislodgment or slipping of the "bucking bar" tends also to cause slipping of the rivet gun from the headed end of the rivet and defacement or ruin of the metal or the like that is being riveted. It is clear from the foregoing that the known procedures of riveting necessarily involve a certain amount of guess work and depend upon the capability and skill of the mechanic to effect a proper rivet joint. However, no matter how skilled the mechanic in the art of riveting, the riveting job resulted in a more or less "hit or miss" proposition in that the formed heads of the rivets are non-uniform in size and are of different heights which, of course, is very undesirable and totally unsatisfactory in numerous instances. In present day "mass production" of aircraft, tanks and various other implements and devices, and where there is involved an "all-out" in production for speed, accuracy, and time being of the essence, my riveting tool, which is a tool to form a head on a rivet, and also my method of riveting fits perfectly into the picture as a whole and admirably serves a useful purpose that is urgently needed now. By practicing the art of riveting, using my riveting tool and method, all

of the aforesaid disadvantages, guess-work and unsatisfactory rivet joints are overcome and production is speeded up materially and the resulting job of riveting is one where all formed heads of the rivets are of uniform size and of the desired and specified height. Then too, my riveting tool is structurally sound and simple as well as being inexpensive to manufacture. In using my riveting tool for forming a head on a rivet and practicing my riveting method it is not necessary that a skilled mechanic be employed, for the riveting is accomplished automatically, so to speak, as regards all of the rivets formed being of uniform size and of the desired height, diameter, etc.

The general object of my invention is to provide a riveting tool that is portable and adapted to form heads all of uniform size, shape and height on the shanks of individual rivets.

Another object of my invention is to provide a riveting tool that is portable and adapted to be held in the hand of the user to form heads of uniform size, shape and height on the shank ends of individual manufactured rivets, each already having a head at the opposite end thereof.

Another object of my invention is to provide a riveting tool that is spring-loaded, portable, and adapted to form heads of uniform size, shape and height on the shank ends of rivets.

Another object of my invention is to provide a riveting tool that is spring-loaded, portable, and adapted to be held in the hand of the user to simultaneously form a head of uniform size, shape and height on one or more shank ends of manufactured rivets already having heads at the opposite ends thereof.

A further object of my invention is to provide a riveting tool that is of utmost safety in use; inexpensive to manufacture, and automatic in use as regards resulting in uniformity of size, shape and height of the rivet heads that are formed.

One object of the invention as regards my method of riveting is to form a riveted joint at the overlapped ends of metallic sheets or the like, or superimposed metallic sheets or the like, whereby all of the heads formed on the rivets are uniform as to shape, size and height.

A further object of my method of riveting resides in forming the heads on a plurality of rivets simultaneously, and each of said heads being of uniform size, shape and height.

A still further object of my method of riveting resides in the formation of a head of predetermined size, shape and height on the shank ends

of manufactured rivets, each already having a head thereon at the opposite end of said shank.

In addition to the foregoing objects, features, and advantages of my invention, there are other objects and advantages relating from the specific steps of my method and also the riveting tool, and these will be pointed out in course of the following detailed description of my invention.

Referring to the accompanying drawing in which I have illustrated two main embodiments of my invention:

Figure 1 is an elevational view of a preferred embodiment of my riveting tool.

Figure 2 is a vertical cross-sectional view taken on the lines 2—2 of Figure 1.

Figure 3 is a horizontal cross-sectional view taken on the lines 3—3 of Figure 2, looking in the direction of the arrows.

Figure 4 is an exploded perspective showing all of the elements of my riveting tool as embodied in Figures 1—3.

Figures 5 and 6 are slight modifications of my invention shown in Figures 1—4.

Figure 7 is an elevational view showing a further embodiment of my invention, and

Figure 8 is a vertical cross-sectional view taken on the lines 8—8 of Figure 7.

Referring to the drawing in detail, and particularly Figures 1 to 4 inclusive, my riveting tool consists of a hollow casing 1, here shown as being substantially square in cross-section and of a size to permit the same to be conveniently and firmly grasped in the hand of the user. This casing may be suitably knurled or otherwise formed or roughened as at 2 to prevent the tool from slipping from the grasp of the user. An anvil, or hammer 3 preferably of solid, hard metal and relatively heavy, acting somewhat as a piston in a cylinder, which anvil is also substantially square in cross-section and complementary in shape to the interior of said casing, is positioned within the casing. The anvil 3 is capable of limited reciprocating or sliding movement in said casing, as will be presently explained. The anvil has integral therewith at its inner-end 3', a centrally disposed boss 3'', of reduced dimensions and the outer end 4 thereof is perfectly flat and constitutes the striking face for engaging a rivet to form a rivet head 5 or heads to be presently explained. The inner end 3' of the anvil, it will be noted, terminates below the end 1' of the casing and thereby provides a space or compartment 6 for the coiled compression spring 7, one end of which engages the boss 3'' on the anvil and the other end of which engages a boss 8 preferably integral with a closure plate 9, and the two said bosses being in spaced alignment.

The closure 9 is anchored or secured to the casing by means of a substantially square casing reinforcing insert which may be welded interiorly of the casing adjacent end 1' thereof as indicated at 11, but it is to be understood that other desirable means may be utilized to secure the said insert within the casing. This anchoring means 10 for the closure 9 is provided with a centrally disposed opening 10' into which the boss of the closure projects, see Figure 2, the said boss 8 being of a lesser diameter than the opening 10', thereby affording a circular space 12 for the upper coils of spring 7. The closure anchoring means 10 is provided adjacent each of its four corners with screw-threaded openings or sockets 13 which register with complementary openings 14 adjacent each of the four corners of the closure 9, and

suitable screws 15 secure the closure 9 to the casing and closure anchoring means 10 by passing through the openings 14 in the closure and being driven home in the threaded openings 13.

It will be seen that when said screws 15 are tightly screwed into the threaded openings 13, see Figure 2, the coiled spring 7 will be compressed somewhat, and will be maintained in working relationship with said anvil, and that upon loosening said screws, more or less, an adjustment of the said spring is obtained.

In order to provide for the limited or restricted sliding or reciprocating movement of the anvil 3 I provide suitable means designated as a whole at 16, which means serves a dual function in that it not only limits or restricts the outward movement of the anvil 3, but also provides an adjustment which determines the size, shape and height of the upsetting or forming of the head 5 at the shank end of the manufactured rivet which already has formed thereon at one end the usual head 5'. This said anvil adjustment and anvil movement limiting means consists of an interiorly threaded nut, boss or the like 17 which may be welded to the casing 1, adjacent an opening 18 therein, or which may be formed integral with the casing; an interiorly threaded lock-nut 19; an exteriorly threaded set-screw 20 having a reduced end 20'; a removable and replaceable bushing 21 having an opening 21' therein to accommodate therein the end 20' of the set-screw and a rectangular recess or groove 22 in one face of the anvil 3, the end walls 22' of the recess serving as an abutment for the bushing 21 in its movement within the casing.

The anvil adjustment and movement limiting means when assembled as shown in Figure 2 operates to limit the outward movement of the anvil 3, so that consequently the heads 5 of the rivets will all be formed uniform as to shape, size and height. By using bushings 21 of different sizes and diameters rivet heads 5 of different shape, size and height can be formed. In other words, the bushing 21 of a given diameter can be replaced by a bushing of a different size and diameter and consequently the head 5 of the rivet will be of a slightly different shape, size and height.

In the modification of my invention shown in Figure 5 I have shown the reduced end 20' of set-screw 20 eccentrically disposed and having the bushing 21 mounted thereon, thus obviating the necessity of substituting bushings 21 of different sizes and diameters. It will be seen that by turning the set-screw 20, in Figure 5, the eccentrically disposed end 20' thereof with the bushing 21 thereon will permit of a wide range of adjustment, as regards limiting the amount of outward movement of anvil 3, and consequently effect different shapes and sizes and heights of the rivet heads 5.

In Figure 6 I have shown a modification of my casing 1 wherein the end 1' thereof is flanged inwardly as at 23, the flanges 23 each having threaded openings 24 therein to receive the screws 15 to secure the closure 9 in place and thus obviate the necessity of using the said insert 10 for this purpose. It is of course understood that the openings in closure 9, when said closure is used in connection with said flanges 23, will be disposed intermediate the four end edges thereof so as to be in registry with openings 24 in said flanges rather than as shown adjacent each corner thereof.

In the embodiment of my invention as shown

in Figures 7 and 8, my riveting tool consists of only 4 parts, namely, casing 30, closure cap 31 therefor, anvil 32 and coiled compression spring 33. The casing 30 here shown is cylindrical and is exteriorly screw-threaded at its upper end portion 34 to receive thereon the closure cap 31 interiorly screw-threaded at 35. Anvil 32 which is of solid metal and relatively heavy is also cylindrical in shape and is capable of sliding or reciprocal movement within the casing, and is provided at one end thereof with an integral centrally disposed elongated cylindrical or other suitably shaped boss 32' which is of considerably reduced diameter than the main body of the anvil 32. Thus, a space or compartment 36 is formed within the casing for accommodating the coil spring 33 therein the latter being concentric with and surrounding the said boss 32' throughout a portion of its length. One end of the coil spring 33 bears against the under-side of the top of closure cap 31 adjacent an opening 31' therein and through which opening the boss 32' projects and slides therein and the other end of said coil spring bears against the main body of the anvil at 37. The striking face of the anvil is indicated at 32''. In order to limit the outward movement of anvil 32, the casing 30 is flanged inwardly at 30'. The thickness of said flange 30' therefore in addition to limiting outward movement of the anvil will determine the size, shape, and height of the head 5 to be formed at the shank end of the rivet. Obviously, it would be a simple matter, and it is intended, to replace casing 30 by another similarly formed casing but having a flange 30' of a different thickness and thereby effect formation of a head on a rivet shank of any predetermined size, shape and height. My cap closure 31 may be knurled or otherwise roughened at 38' to permit a firm grip by the user and also to effect more or less pressure or compression on the coil spring 33, as desired, by simply turning the cap.

The operation or manner of use of my riveting tool can be deduced by an explanation of my method of riveting which is as follows: A rivet, preferably a manufactured rivet, having a head 5' already formed thereon is inserted through registered openings C and D in overlapped or superimposed sheets or plates A and B. The user then grasps my riveting tool in one hand and holds a riveting gun in the other hand and applies the end C or ends C thereof to the already formed head or heads 5' of said rivet or rivets. Then my riveting tool is held in firm engagement with the shank end of the rivet with the end 1' of the casing 1 firmly in engagement with the sheet A and the striking face 4 of anvil 3 under spring pressure against the extreme outer end of the shank of the rivet or rivets, as the case may be and then by setting the riveting gun into operation the impact delivered by the riveting gun will cause the anvil 3 to rapidly reciprocate or rebound within the casing, in harmony with the said impact from said riveting gun, and the anvil will consequently deliver a series of regulated sharp forceful blows to the rivet, or a plurality of rivets as the case may be, and cause the shank end of the rivet or rivets to become upset or deformed and form into a head or heads 5 as shown, the said head or heads 5 having flat tops and rounded sides as shown at 5''.

The sequence of steps of my riveting method recited herein may be transposed as desired to accomplish a particular and desired rivet joint, job, or operation. Broadly my method of riveting

includes the steps of applying a conventional riveting gun or similar impact delivering device to the already formed head of a conventional rivet and applying or holding a spring-loaded or similar resilient riveting tool against the shank end of the rivet, then start the operation of the riveting gun thereby transmitting the impact delivered by said riveting gun to the said spring-loaded riveting tool which results in rapid reciprocation of an anvil or the like carried by said tool and which delivers a series of sharp forceful regulated blows to a rivet or rivets which effects an upsetting or deformation of the shank end of the rivet or rivets thereby forming a head or heads and all such rivets so treated resulting in heads formed thereon being of a uniform size, diameter, shape and height.

Obviously my riveting tool when in use in combination with a conventional rivet gun or similar impact delivering device will result in a rapid reciprocation of the anvil within the casing caused by transmission of impact from the riveting gun, and upon each inward movement of the anvil the said spring will be compressed and the motive force of said spring will cause the anvil to return and deliver a series of sharp forceful regulated blows to the shank end of a rivet or rivets and thereby causing an upsetting or deformation to form heads on the said shank ends of rivets and all of which will be uniform in size, shape, diameter and height. I have shown only the working end C of a rivet gun, it being understood that any standard or conventional gun or similar impact delivering device may and can be used. It is to be understood further that one or more working ends C of the rivet gun can be used as desired, depending upon the circumstances.

My riveting tool is preferably constructed entirely of metal, but other materials may be used in whole or in part, if found desirable. In Figures 1-6, inclusive, I have shown my tool as being square in cross-section and it is to be understood that other shapes such as cylindrical, hexagonal, octagonal or any other shapes and exterior contours may be resorted to within the scope of the claims appended hereto.

What is claimed is:

1. A riveting tool consisting of a hollow casing and rivet head forming means including a striking face and the latter being movable only within the confines of said casing
2. A riveting tool consisting of a hollow casing and spring-actuated rivet head forming means including a striking face and movable only within the confines of said casing.
3. A riveting tool consisting of a hollow casing and resiliently actuated rivet head forming means mounted for movement only within the confines of said casing, the said means effecting formation of heads on a plurality of individual rivets all of which heads are of uniform size, shape and height.
4. A tool for forming heads on rivets, said tool consisting of a hollow casing open at one end and closed at its other end, an anvil rivet head forming means including a striking face mounted in said casing and adapted to reciprocate only within the confines of the casing therein, means constantly urging said anvil toward the said open end of said casing whereby upon delivery of impact to said anvil the latter will reciprocate and deliver sharp blows to and form heads on rivets.
5. A tool for forming heads on rivets, said tool consisting of a hollow casing adapted to be held in the hand of the user and being open at one

end thereof and closed at its other end, a relatively heavy anvil rivet head former including a striking face mounted in said casing and adapted to reciprocate only within the confines of said casing and providing a space therein at the closed end thereof, coil spring means mounted in said space in the casing and having one end thereof engaging the said anvil and its other end engaging the closed end of the casing, said spring constantly urging the anvil toward the said open end of the casing whereby upon delivery of impact to said anvil the latter will reciprocate and rebound to deliver sharp forceful blows to and form heads on rivet shanks.

6. A tool as described in and by claim 5 including means to limit the movement of the anvil toward the open end of the casing.

7. A tool described in and by claim 5 including adjustable means to limit the movement of the anvil toward the open end of the casing.

8. A tool for forming heads on rivets, said tool consisting of a hollow polygonal casing having a polygonal interior and adapted to be held in the hand of the user and being open at one end thereof and closed at its other end, a heavy anvil having a polygonal exterior contour complementary in shape to, mounted in, and adapted for reciprocation only within, the interior confines of said hollow casing and being of lesser dimensions than said casing interior to provide a space therein adjacent its closed end, a coil spring mounted in said space with one end thereof engaging the said anvil and its other end engaging the closed end of the casing, and the said coil spring constantly urging the anvil toward the said open end of the said casing whereby upon delivery of impact to said anvil the latter will reciprocate and rebound to deliver sharp forceful blows to and form heads on rivet shanks.

9. A tool as described in and by claim 8 including means to limit the movement of the anvil toward the open end of the casing.

10. A tool as described in and by claim 8 including adjustable means to limit the movement of the anvil toward the open end of the casing.

11. A tool as described in and by claim 8 including means to limit the movement of the anvil toward the open end of the casing, said means consisting of a set-screw in threaded engagement with and extending laterally through

and into the casing and having a bushing on its inner end the latter operating in a rectangular recess in the anvil, the end wall of said recess constituting an abutment to limit the said movement of the anvil toward the open end of the casing.

12. A tool as described in and by claim 8 including means to limit the movement of the anvil toward the open end of the casing, said means consisting of a set-screw in threaded engagement with and extending laterally through and into the casing and having an eccentrically disposed extension at its inner end, a bushing mounted concentrically on the said eccentric extension, and the anvil having a rectangular recess in one face thereof in direct alignment with the set-screw and bushing and the latter and its eccentric mounting being disposed within said recess, the end wall of which constitutes an abutment for the bushing to thereby limit the movement of the anvil toward the open end of the casing.

13. A tool as described in and by claim 5 wherein the open end of the casing is flanged inwardly at substantially right angles to the casing and constitutes means to limit the movement of the anvil toward said open end of the casing.

14. A riveting tool consisting of a hollow casing, adapted to be held in the hand of the user, and rivet head forming means including a striking face, and the latter being movable only within the confines of said casing.

15. A riveting tool as described in and by claim 14 wherein the diameter of the striking face is such that heads all of substantially the same size, shape and height, will be formed simultaneously on a plurality of rivets.

16. A rivet tool consisting of a hollow casing, adapted to be held in the hand of the user, and spring-actuated rivet head forming means including a striking face and movable only within the confines of said casing.

17. A riveting tool as described in and by claim 16 wherein the diameter of the striking face is such that heads all of substantially the same size, shape and height, will be formed simultaneously on a plurality of rivets.

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