Aug. 3, 1937. L. SERRA 2,088,978

STAMPING OR BURR FORMING TOOL

Original Filed July 12, 1935

FIG. 1.

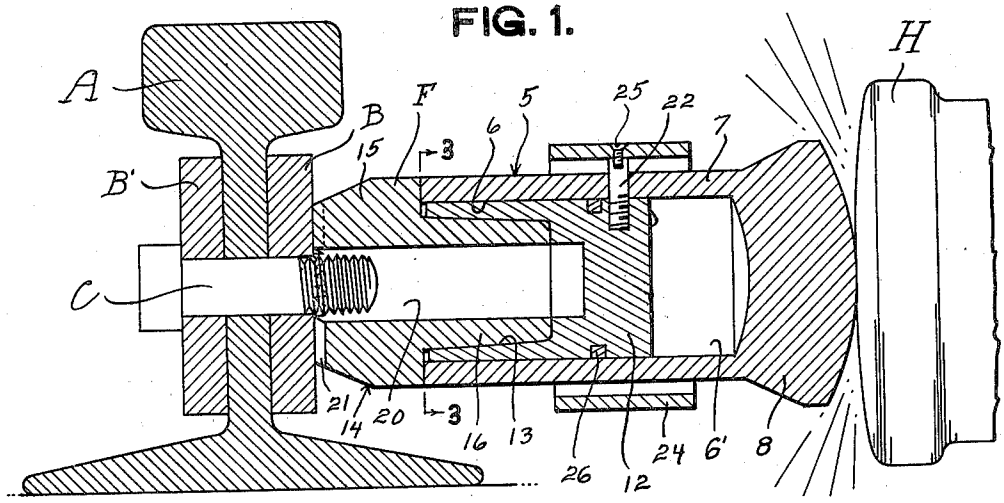


FIG. 2.

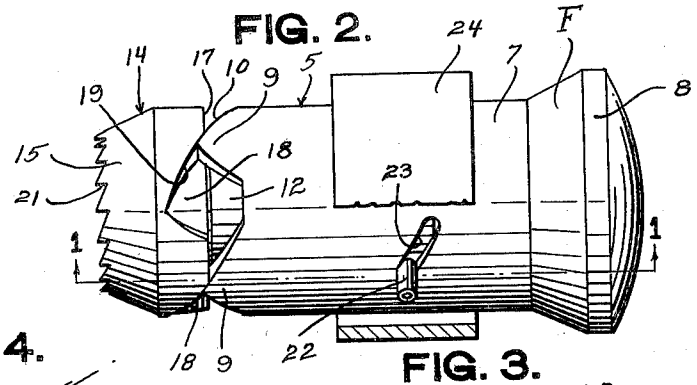


FIG. 4.

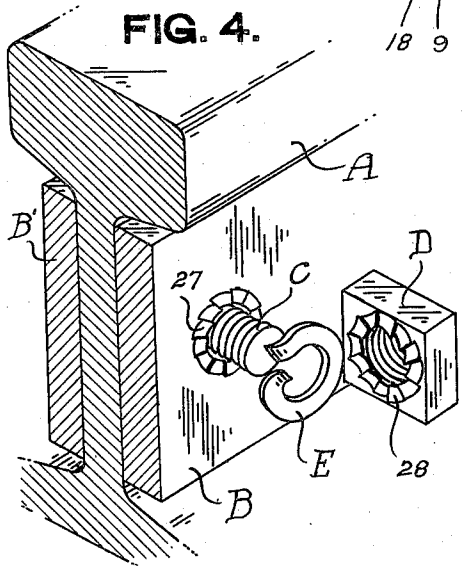
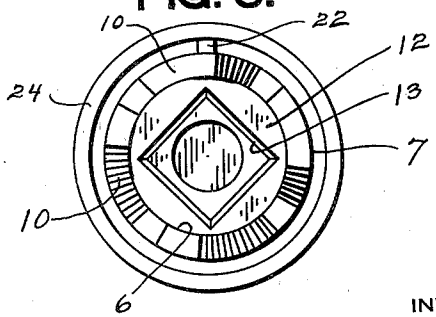


FIG. 3.



INVENTOR.

Luigi Serra

BY Lancaster, Allwine & Rommel

ATTORNEYS.

Patented Aug. 3, 1937

2,088,978

UNITED STATES PATENT OFFICE

2,088,978

STAMPING OR BURR FORMING TOOL

Luigi Serra, Washington, D. C.

Application July 12, 1935, Serial No. 31,132
Renewed December 12, 1936

3 Claims. (Cl. 78—1)

The present invention relates to a tool for use in securing screw threaded fastening elements such as bolts, nuts, screws, etc., and the primary object of the invention is to provide a tool adapted for operation by a blow from a hammer or the like for imparting slight turning or rotary movement to an air cushioned tool member.

A further object of the invention is to provide a stamping or burring tool for forming or raising an annular series of ratchet-like teeth or burrs upon nuts or bolts and the work piece to be held thereby for co-acting with a lock washer to resist loosening of the nut or bolt.

A further object of the invention is to provide a tool of this character wherein the tool member is readily removable so as to adapt the device for use as a wrench in tightening or loosening bolts and nuts, and also for use as a screw driver in tightening and loosening screws.

A further object of the invention is to provide a device of this character which will stand up under hard use and which is of such construction as to be readily centered when used as a burr forming or raising tool.

Other objects and advantages of the invention will be apparent from the following detailed description, taken in connection with the accompanying drawing forming a part of this specification and in which drawing:—

Figure 1 is a central longitudinal section thru the tool shown in use for forming an annular series of burrs upon a work piece, the section being substantially on the line 1—1 of Figure 2.

Figure 2 is a view in side elevation of the tool and showing a portion of the hand hold ring broken away.

Figure 3 is a view on the line 3—3 of Figure 1 and showing the tool member removed.

Figure 4 is a sectional perspective view thru a rail joint showing a nut and one of the fish plates formed with the burrs.

Referring to the drawing in detail and wherein like reference characters designate corresponding parts thruout the several views, the tool has been shown by way of example in use in connection with railway rails, but it will be readily understood that the tool is in no way limited to such use. In the drawing, the letter A designates a rail section, and as in usual practice, fish plates B and B′ are employed for making connections between the ends of adjacent rails. These fish plates are secured by bolts C having their shank passed thru aligning openings in the plates and the web of the rail, and a nut D is threaded upon the bolt. A spring lock washer E is placed beneath the nut D for engaging the smooth outer face of the fish plate B. In usual practice, the locking action created by this lock washer when the nut is tightened, depends upon a slight biting in of the offset ends of the washer into the confronting faces of the nut and fish plate. With the improved tool F of this invention, an annular series of ratchet-like teeth or burrs may be formed upon the confronting faces of the nut and fish plate, which will be so arranged and co-act with the ends of the lock washer E as to resist any counter turning or loosening of the nut D due to vibration or other causes.

The stamping or burr forming tool F may be made in various sizes and comprises a body member 5 provided with an axial bore 6 forming a tubular body portion 7 which is closed at its outer end with an enlarged, relatively massive striking head or anvil 8 intended to be struck by a hammer such as at H for operating the tool. The opposite or inner end of the tubular body portion 7 is formed with a suitable number of evenly spaced apart cam lugs or projections 9 of substantially V-shape and each having a preferably slightly convex, spiraling cam edge or face 10. While it is preferred to provide two or more of these cam lugs 9 about the inner end of the tubular body portion 7 for more even distribution of strain, only one of the cam lugs may be provided if so desired.

Mounted for rotary and sliding movement with a working fit in the bore 6 of the body member 5 is a cylindrical chuck or socket member 12 of a length less than the length of the bore 6 and being closed at its inner end forming an air chamber 6′. Formed in the socket member 12 and opening at the outer end thereof is a square, tapering socket 13 for removably receiving a tool member 14 in co-axial alignment with the body member 5.

This tool member 14 embodies a working or tool head 15 which in the example shown is in the form of a burring die having a diameter substantially equal to the diameter of the tubular body portion 7. Formed integral with the working head 15 is a square, tapering shank 16 for fitting in the tapering socket 13 whereby the tool member is held against rotation in the socket member 12. The working or tool head 15 provides a shoulder 17 having formed therein an annular series of evenly spaced apart cam pockets 18 of substantially V-shape and each having a preferably slightly concaved spiraling cam edge or face 19 for co-acting with the cam edges 10 of the cam lugs 9. The tool member 14 is provided with a longitudinal guide bore 20 which ex-

tends entirely thru the member and opens axially thru the die head 15. The burring die head 15 preferably tapers toward its tubular shaped working end and this working end is formed with an annular series of ratchet shaped cutting teeth 21 so disposed as to cause a cutting in and burring up of the metal being operated upon when the head 8 is struck a blow with a hammer.

Means is provided to limit longitudinal and rotary movement of the socket member 12 relative to the body member 5, and to normally retain these members against separation with the cam lugs 9 in proper operative relation to their respective cam pockets 18. This means preferably consists of a retaining pin 22 threaded or otherwise secured in the inner end portion of the socket member 12 and projecting radially therefrom thru a spirally formed slot 23 in the intermediate portion of the tubular body portion 7. This slot 23 extends spirally in the same direction about the body portion 7 as do the cam faces 10 of the cam lugs 9 as is shown in Figure 2. Also, by observing Figure 2 it will be seen that when the socket member 12 is fully withdrawn, with the pin 22 abutting an end of the spiral slot 23, the cam lugs 9 project slightly into the cam pockets 18 with the cam surfaces 10 contacting the cam surfaces 19.

Encircling the tubular body portion 7 is a hand hold ring 24 which may be secured to the outer end of the retaining pin 22 as by a screw or other fastening means 25 whereby the ring 24 is movable with the socket member 12. This ring 24 is spaced from the body portion 7 by the pin 22 and aside from relieving shock upon the hand of the operator holding the tool, allows for the tool member 14 being held in engagement with the work piece.

An air cushioning arrangement is provided for relieving wear upon the tool by cushioning the blow applied thereto. The cylindrical socket member 12 forms a piston operating in the bore 6 and is preferably proviided adjacent its closed end with a sealing ring 26. When the socket member 12 is withdrawn for its limit of outward movement from the body member 5, a small end portion of the spiral slot 23 adjacent to the head 8 projects beyond the closed end of the socket member forming a small opening to the chamber 6' as shown in Figures 1 and 2. When the head or anvil 8 is struck a blow with a hammer, air is first permitted to escape from the chamber 6' thru the open end of the slot 23 as the socket member moves into the bore 6. As the member 12 moves into the bore 6, the slot 23 is fully closed thus forming a closed air chamber in the bore between the head 8 and member 12 in which the air will be compressed for cushioning the blow of the hammer. This cushioning arrangement will prevent portions of the body member 5 from striking portions of the tool member 14 such as would tend to distort one or the other.

In use of the tool F for the purpose shown by way of example in Figures 1 and 4, the tool may be used for forming an annular series of ratchet-like burrs or teeth 27 on the face of the fish plate B concentrically about the bolt hole therein, and also used for forming a like annular series of ratchet-like burrs or teeth 28 on the inner face of the nut D concentric with the threaded hole therein. In forming the burrs or teeth 27 on the fish plate or work piece B, the bolt C may be placed in position with its threaded shank end projecting thru the plate B. This projecting end of the bolt shank forms a guide for proper positioning of the tool and is received in the guide bore 20 as shown in Figure 1. With the tool in its extended position as in Figure 1, the die head 15 is held against the plate B and the head 8 struck with a hammer. This blow struck by the hammer will, thru the action of the cam surfaces 10 of the cam lugs 9 acting upon the cam surfaces 19 of the cam pockets 18, impart a slight rotary movement to the tool member. This compound rotary and axial movement of the tool member causes the teeth 21 to plow or cut into the metal and at the same time raise or turn up a series of ratchet-like burrs 27. In forming the burrs upon the nut, the nut is preferably threaded backward upon the bolt so that the shank of the bolt may serve as a centering means for the die. The nut is then removed and threaded properly upon the bolt after first placing the lock washer E. When the nut is threaded upon the bolt, the annular series of ratchet-like teeth 27 and 28 will so co-act with the ends of the lock washer as to securely prevent loosening of the nut.

When the tool is struck with a hammer, there will first be a quick axial and slight rotary movement of the body member 5 until the spiral slot 23 is closed by the socket member 12 and after which the full force of the blow is transmitted through the cam lugs 9 to the tool member 14. The axial movement of the substantially massive body member 5, upon being arrested by the air entrapped in the closed air chamber 6' of the bore 6 will give a quick slight axial movement to the tool member 14 and cause the teeth 21 to bite into and turn up the metal for formation of an annular series of ratchet-like teeth.

By having the tool member 14 readily removable from the socket member 12 will allow for the placing of various other tool members such as screw driver bits, wrenches, etc., in the tool for tightening and loosening of screws, bolts, etc. While it is preferred to have the tool member removable, if so desired the socket member 12 may be formed integral with the tool member and form a shank therefor slidably and rotatably fitting in the bore 6.

Changes in details may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A tool of the class described comprising a body member including a tubular body portion closed at its outer end, a series of cam lugs provided about the inner open end of the tubular body portion, a socket member including a piston portion slidable and rotatable in the tubular body portion and forming therewith a cushioning chamber, a tool member carried by the socket member, a series of cam pockets on the tool member into which the cam lugs extend for imparting rotation to the tool member, a spiral slot in the tubular body portion and providing an opening to said cushioning chamber when said piston portion is in its outward limit of movement in the tubular body portion, and a retaining pin projecting radially from said socket member thru the spiral slot.

2. A tool of the class described comprising a body member including a tubular body portion closed at one end, a series of cam lugs provided about the open end of the tubular body portion, a tool member slidable and rotatable in the tubular body portion, a series of cam pockets on the

tool member into which the cam lugs extend for imparting rotation to the tool member, a spiral slot in the tubular body portion, a retaining pin movable with the tool member and projecting radially thru the spiral slot, and a hand hold ring secured to the outer end of the retaining pin in spaced relation to the tubular body portion.

3. A burr forming tool comprising a body member including a tubular body portion closed at one end by an enlarged striking head, a series of cam lugs provided about the open end of said body portion, a socket member fitting in the tubular body portion and having a tapering polygonal socket, a die tool member having a tapering polygonal shank fitting in said socket, a series of cam pockets on the tool member for coacting with said cam lugs, and means retaining the socket member within the tubular body portion and permitting limited rotary and longitudinal movement between the members.

LUIGI SERRA.