Feb. 16, 1937. E. B. GEORGE 2,071,281

BODY AND FENDER STRAIGHTENING TOOL

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Fig. 1.

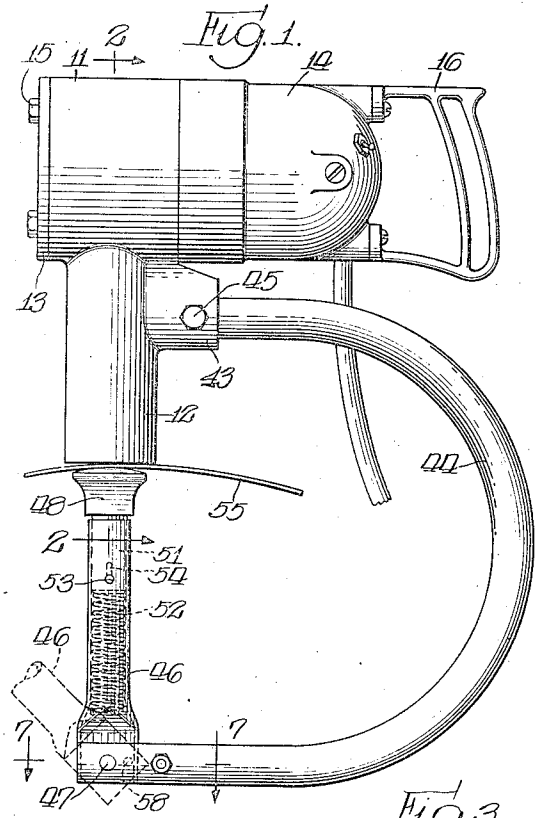


Fig. 2.

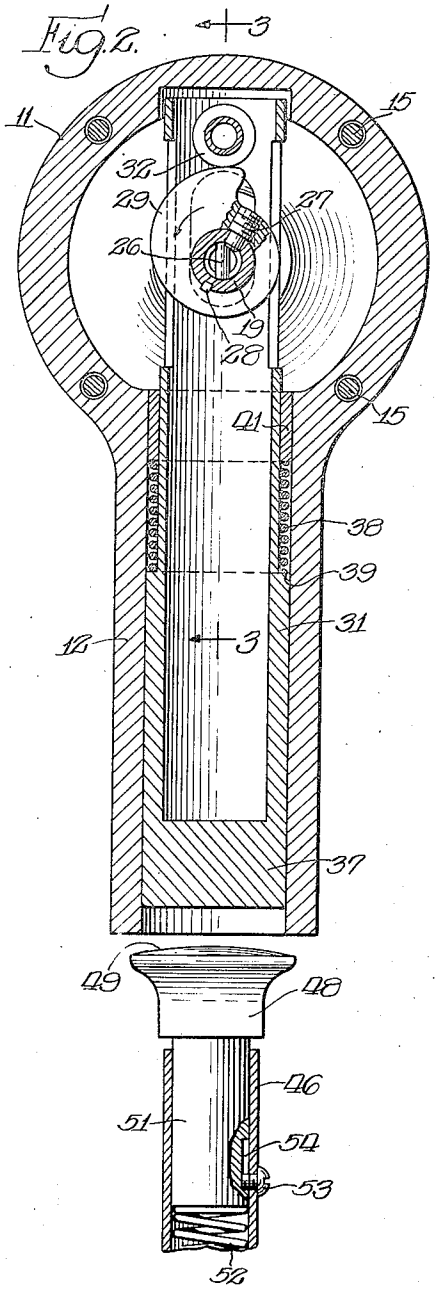
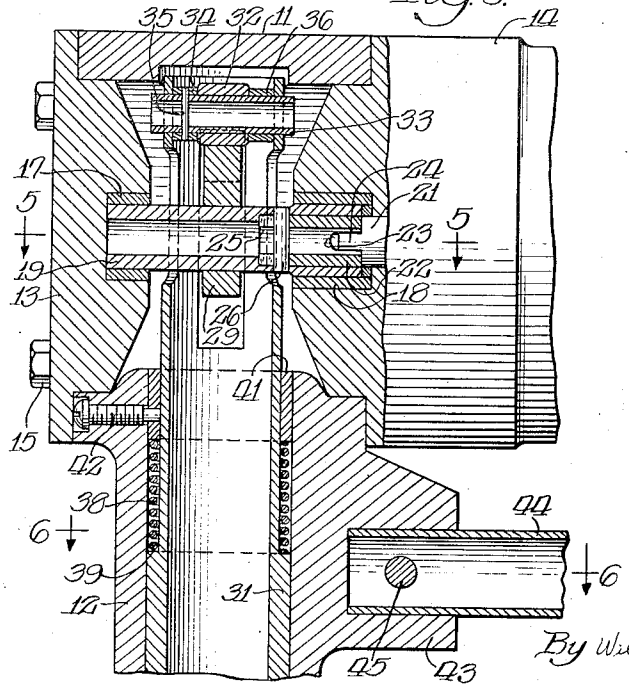


Fig. 3.



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Fig. 4.

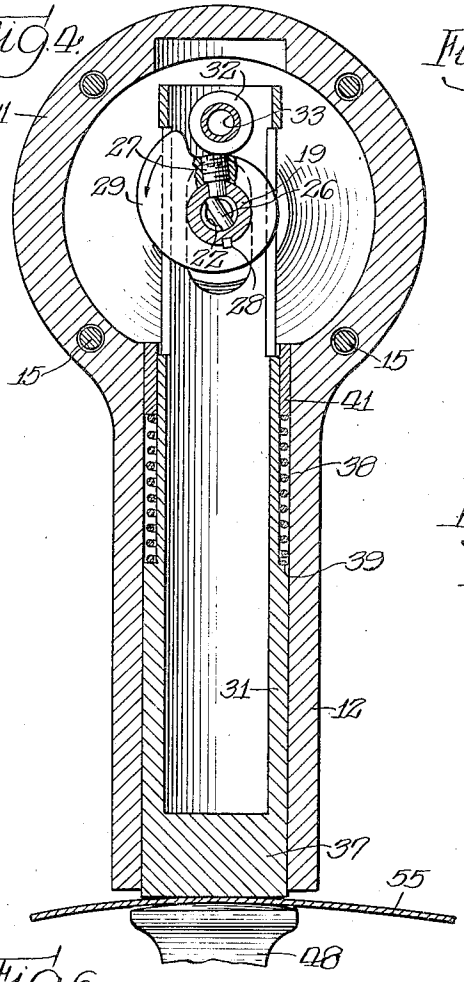


Fig. 5.

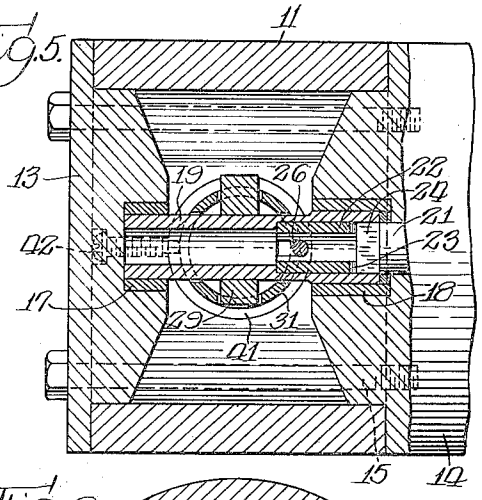


Fig. 8.

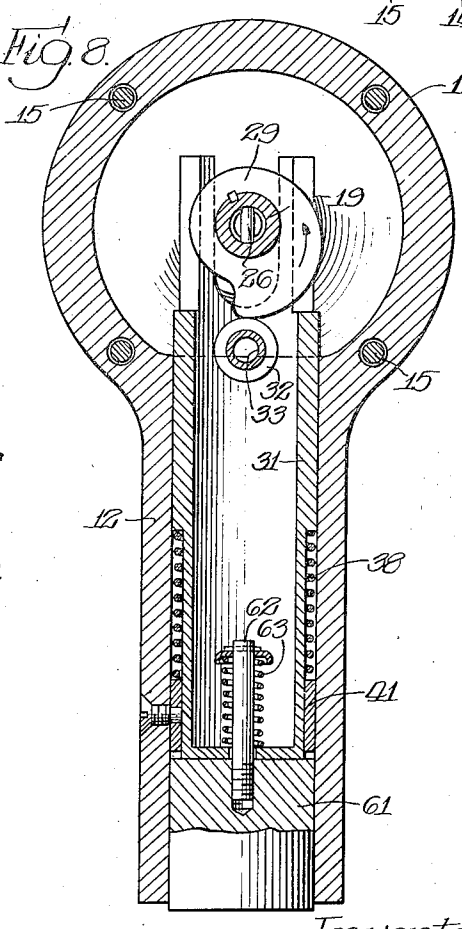


Fig. 6.

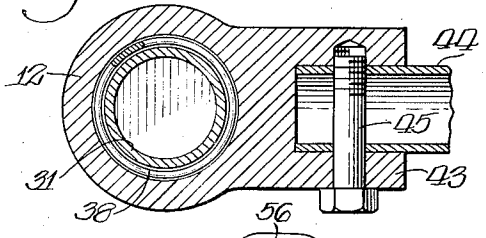
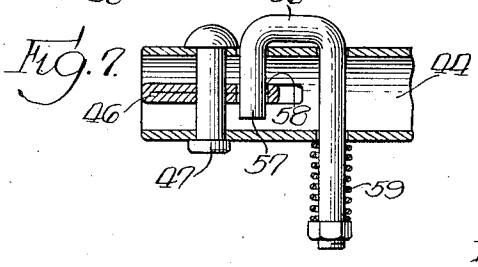


Fig. 7.



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UNITED STATES PATENT OFFICE

2,071,281

BODY AND FENDER STRAIGHTENING TOOL

Edward B. George, Chicago, Ill., assignor of one-half to J. F. Greenebaum, Chicago, Ill.

Application January 10, 1936, Serial No. 58,469

6 Claims. (Cl. 153—32)

This invention relates in general to impact tools and, while the principles thereof may be embodied in tools for performing work of various characters, they are herein exemplified as embodied in a tool designed for use by sheet metal workers and particularly automobile repairers for the purpose of straightening and reforming damaged automobile bodies and fenders.

One of the primary purposes of my invention is to provide a tool of the character indicated which will be light and capable of being easily handled and which will be rapid, efficient, and accurate in operation, so that the distorted metal of the damaged fender or body may be quickly and accurately straightened and reformed into the desired original shape.

Another object is to provide a novel and improved tool which will not only straighten and shape the metal being operated upon but will at the same time smooth out the minor irregularities in the metal so as to produce a smooth and even surface for the reception of the finish.

Other objects and advantages of the invention will be apparent as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawings.

Referring to the drawings,

Fig. 1 is a side elevation of a tool constructed in accordance with my invention;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 2 showing the hammer in projected position;

Fig. 5 is a sectional view on the line 5—5 of Fig. 3;

Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 3;

Fig. 7 is a fragmentary sectional view on the line 7—7 of Fig. 1; and

Fig. 8 is a view similar to Figs. 2 and 4 showing a modified form of the invention.

Referring now to the drawings more in detail, reference character 11 indicates generally a cylindrical housing having a depending cylindrical extension 12 within which the hammer reciprocates. The outer end of the housing 11 is closed by a cover plate 13 shaped to provide a shaft bearing and the other end of the housing is closed by the casing 14 of an electric motor also shaped to provide a shaft bearing in alignment with the bearing in the cover 13, the parts 11, 13, and 14 being rigidly secured together into a unitary structure by a plurality of bolts 15 passing through the cover 13, the housing 11, and threaded into tapped openings in the motor housing 14. A handle 16 secured to the outer end of the motor casing affords provision for holding and manipulating the tool in operation.

The opposed bearings formed in the cap 13 and motor housing 14 are equipped with bearing members 17 and 18, respectively, in the form of bushings as shown, or in the form of roller or ball bearings if preferred, which are adapted to rotatably accommodate main cam shaft 19 as shown in Figs. 3 and 5. This shaft is driven from the motor shaft 21 through a direct drive which, for purposes of minimizing vibration, provides a universal connection between the shafts 19 and 21. This connection comprises a short hollow shaft 22 provided at its outer end with transverse slots 23 adapted to accommodate the flattened projection 24 extending from the shaft 21. The shaft 22 is similarly slotted at its inner end, as indicated at 25, these slots being disposed at right angles to the slots 23 and adapted to receive a pin 26 secured in and extending through the shaft 19. A universal non-vibrating driving connection is thereby afforded between the motor shaft 21 and the shaft 19.

Upon the shaft 19 midway between its bearings there is fixedly secured by a screw 27, and a key 28 also if desired, a cam 29 contoured as shown in Figs. 3 and 4. This cam is adapted to actuate a cam follower carried by the piston or hammer 31 and comprising a roller 32 journaled upon a trunnion 33 extending through the walls of the upper portion of the piston and secured against displacement by a collar 34 which is attached by a pin 35 to the trunnion. A second collar 36 interposed between the follower roller 32 and the opposite wall of the piston prevents lateral displacement of the roller on the trunnion and maintains it in alignment with the cam 29. The upper portion of the piston is slotted as shown to accommodate the shaft 19 and the cam mounted thereon.

The lower end of the piston, which acts as the impact tool and which is termed the hammer, is relatively thick and heavy as indicated by reference character 37 and is so proportioned with respect to the cam that when retracted upwardly by the cam, as shown in Fig. 2, the hammer is withdrawn within the cylindrical extension 12 and when projected on its operative stroke into the position shown in Fig. 4 it extends beyond the end of the cylindrical guide portion 12. In this form of the invention the projecting or

operative stroke of the piston is accomplished by a coiled expansion spring 38 interposed between a circumferential shoulder 39 formed on the piston and a ring or collar 41 surrounding the reduced portion of the piston and retained in position by a holding screw or bolt 42. It will be apparent that as the cam is rotated in a clockwise direction viewing Fig. 2 the piston will be alternately retracted to its uppermost position illustrated in Fig. 2 by the cam 29 and projected into the extended position, illustrated in Fig. 4, by the spring 38.

A boss 43 formed on the side of the cylindrical guide extension 12 serves as the anchorage for a bowed anvil supporting member 44, the free end of which is disposed in substantial alignment with the impact tool but spaced an appreciable distance therefrom. This support is of bow shape in order to accommodate the work beneath the hammer and may be either longer or shorter, depending upon the size of the object to be operated upon. In practical service interchangeable supports may be utilized, one of which may be substituted for the other as the character of the work requires by merely removing the anchor bolt 45.

At its free end the anvil support carries an anvil base 46, preferably of tubular construction, flattened at its lower end and extending through a slot into the member 44 where it is pivotally mounted upon a pin 47. The anvil proper comprises a head 48, the convexity of the upper surface 49 of which may vary in conformity with the desired shape to be produced, supported upon a neck 51 telescopically associated with the base 46. To lend a limited yieldability to the anvil a relatively stiff spring 52 disposed within the base serves to support the anvil which is prevented from displacement from the base under the influence of the spring by a stop screw 53 threaded through one wall of the base and projecting into a groove 54 formed in the neck 51.

The anvil is illustrated in operative position in Figs. 1, 2, and 4 but may be swung on its pivot pin 47 to inoperative position, as indicated in dotted lines in Fig. 1, to permit the introduction and withdrawal of the work, which is indicated in Fig. 1 by reference character 55. The anvil is maintained in upright operative position by a U-shaped lock pin 56, the short leg 57 of which is adapted to engage in an opening 58 in the base 46, as shown in Fig. 7. A coiled expansion spring 59 serves to hold the locking pin in locking engagement with the anvil base, but the base may be freed for tilting movement by pressing the projecting end of the locking member inwardly against the force of spring 59 so as to release the leg 57 from the opening in the base.

The operation of my improved tool should be obvious. The anvil is tilted to inoperative position, the work is introduced between the anvil and the lower end of the guide cylinder 12, whereupon the anvil is restored to operative position and locked. The current is then turned on and, as the motor revolves the shaft 19 at high speed, the hammer will be alternately retracted by the cam 29 and projected by the spring 38 with the result that a succession of rapidly delivered blows is imparted to the work disposed over the anvil head. The tool may be moved about and tilted during the operation with the result that the material being operated upon is worked into a smooth even shape and all bends and wrinkles are removed so that an entirely smooth, properly shaped article is produced.

In the form of the invention shown in Fig. 8 the hammer, instead of being positively retracted and spring projected, is spring retracted and positively projected. As will be apparent from the drawings, the cam follower 32 in this instance is mounted below instead of above the cam 29, and the ring abutment 41 is at the lower instead of the upper end of the piston guide member. The spring 38 serves to raise instead of lower the piston with the result that the piston or hammer is spring retracted and positively projected.

In this form of the invention also the hammer 61 is structurally independent of the piston and has a lost motion connection therewith through a stud 62 and a spring 63. The abutment ring 41 is so positioned that upon the up stroke of the piston the hammer 61 will engage this ring and be prevented thereby from further upward movement. The piston, however, will continue its full upward stroke during which the spring 63 will be compressed after the movement of the hammer has ceased. Upon the down or working stroke the end of the piston will strike the hammer, thereby causing it to deliver a sharp blow to the material being operated upon.

The details of construction illustrated and described are manifestly capable of considerable modification and variation without departing from the essence of this invention as defined in the following claims.

I claim:

1. An impact tool comprising an electric motor, a cam driven thereby, a piston operable by the cam in one direction, a spring for moving said piston in the opposite direction, a housing for said piston, cam, and motor, a bowed anvil support rigidly and detachably connected at one end to and supported by said housing, an anvil base pivotally mounted on the other end of said support, means for locking said anvil base in alignment with said hammer, an anvil located at the free end of said base and a spring carried by the base for yieldingly maintaining said anvil in operative relation to said hammer.

2. An impact tool comprising a housing provided with a cylindrical radially projecting extension, a hollow cylindrical piston member reciprocable in said extension and extending into said housing, a motor driven shaft journaled in said housing, a cam fixed on said shaft, said piston member being provided with a pair of longitudinally disposed slots through which said shaft extends and with a second pair of longitudinally disposed slots to accommodate said cam, a cam follower mounted in said piston member in cooperative relation with said cam, a spring for actuating said piston in opposition to said cam, and an anvil positioned to receive the impact of said hammer.

3. An impact tool comprising a cylindrical housing member provided with a radially projecting hollow extension, a hollow piston member reciprocable in said housing and extension, a motor housing closing one end of said housing member, a cap closing the opposite end of said housing member, a shaft extending through said piston member and journaled at one end in said cap and at its other end in said motor housing, a cam on said shaft disposed substantially on the axis of said piston member, a follower carried by the piston member in cooperative relation to said cam, and means for yieldingly actuating said piston member in opposition to said cam.

4. An impact tool comprising a cylindrical housing provided with a radially projecting cy-

lindrical extension, a hollow piston member reciprocable within said extension and projecting into said housing and provided with a plurality of pairs of longitudinally extending slots, a motor housing closing one end of said housing member, a cap closing the opposite end thereof, a shaft extending through one pair of slots in said piston member and journaled at its opposite ends in said motor housing and cap, a cam on said shaft operable in the other pair of slots, a cam follower carried by the piston member, and means acting on said piston member for yieldingly urging said follower into engagement with said cam.

5. An impact tool comprising a housing, a piston member reciprocable therein, a hammer yieldably connected to the lower end of said piston member, a fixed abutment positioned in the path of the upward movement of said hammer, and a spring interposed between said abutment and said piston member in position to move the piston member to bring the hammer into engagement with said abutment.

6. An impact tool comprising a housing having a cylindrical guiding portion, a piston member provided with a shoulder reciprocable therein, a fixed abutment in said guiding portion, a spring interposed between said abutment and the shoulder on said piston member, and a hammer having a lost motion connection with said piston member.

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