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D. B. GRAVES ET AL

2,783,670

IMPACT TOOL

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Fig. 1

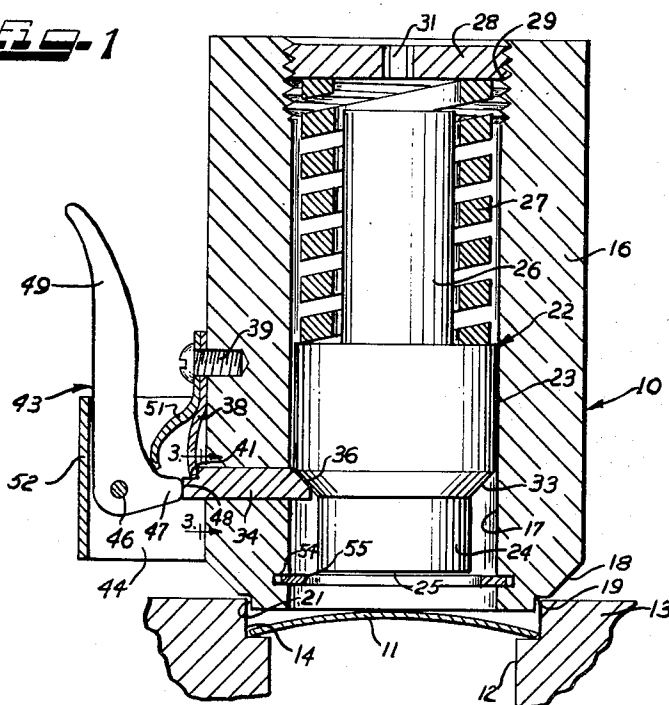


Fig. 2

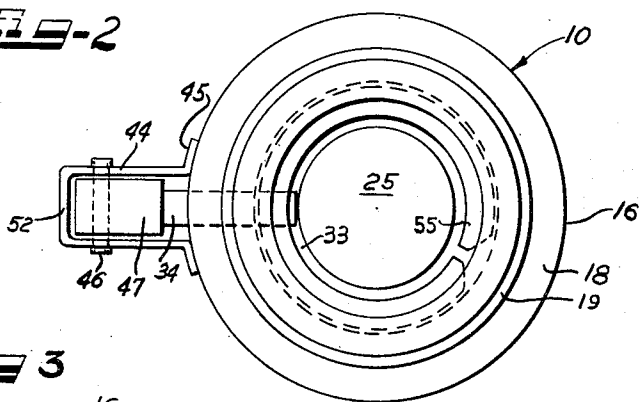
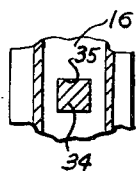


Fig. 3



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IMPACT TOOL

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This invention relates to impact tools and more particularly pertains to a portable impact tool.

An important object of this invention is to provide a portable impact tool which is adapted to be supported and operated with one hand.

Another object of this invention is to provide a portable impact tool which may be easily positioned and operated in confined spaces.

A further object of this invention is to provide a portable impact tool having a novel construction for releasably retaining the inertia element in its cocked position arranged to permit releasing of the inertia element with a minimum of effort.

Still another object of this invention is to provide a portable impact tool which is particularly adapted for inserting and removing expansion plugs.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings wherein:

Figure 1 is a longitudinal sectional view through the impact tool shown in position to apply an expansion plug;

Fig. 2 is an end elevational view of the impact tool; and

Fig. 3 is a fragmentary sectional view, taken on the plane 3—3 of Fig. 1.

The impact tool, designated generally by the numeral 10 is particularly adapted for inserting and removing the dome-shaped expansion plugs 11 commonly used to seal openings in castings such as the core opening 12 in the cylinder block 13 of an internal combustion engine. Such core openings are provided to facilitate casting of the cylinder block and in order to seal these openings, the latter are counterbored as indicated at 14 and the dome-shaped expansion plug disposed therein. The expansion plug is sealed to the casting by hammering on the central portion thereof to change the curvature and thereby radially expand the plug into a tight fit with the casting.

The expansion plugs 11 frequently work loose after a period of time and develop a leak therearound. It is then necessary to remove the expansion plugs and insert new plugs in their place. Because of the numerous parts located under the hood of an automobile, there is frequently insufficient space around the cylinder block to permit manipulation of a hammer for inserting and removing these plugs.

The impact tool 10 is arranged so as to be supported and operated with one hand to permit manipulation of the impact tool in the confined spaces under the hood. More particularly, the impact tool includes a heavy cylindrical body 16 having an axial bore 17 extending therethrough. The thickness of the walls of the body are made sufficient to provide the necessary weight in the body to absorb the reaction of the inertia element, to be described more fully hereinafter. One face of the

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body 16 is chamfered as indicated at 18 and is formed with an annular groove 19 in the end thereof to provide a reduced diameter nose portion 21 having a diameter to be loosely inserted in the counterbore 14 to center the impact tool thereon.

A plunger designated generally by the numeral 22 is slidably disposed in the bore 17 and, as best shown in Fig. 1, includes an enlarged intermediate portion 23 having a sliding fit in the bore and a reduced diameter nose portion 24 extending from one end thereof and terminating in a striking face 25. A reduced diameter guide portion 26 extends axially from the other end of the intermediate portion 23 and a heavy compression spring 27 is disposed around the guide portion within the bore. One end of the spring 27 engages the intermediate portion on the plunger and the other end engages an abutment 28 which is threadedly received in the internally threaded end 29 of the bore. The abutment is thus threadedly adjustable longitudinally of the bore to vary the compression of the spring 27 and, conveniently, the air hole 31 provided in the abutment is formed of a polygonal cross-section for the reception of a suitable tool to facilitate adjustment of the abutment.

A beveled shoulder 33 is formed at the juncture of the intermediate portion 23 and the reduced diameter nose portion 24, which shoulder extends downwardly and inwardly from the intermediate portion. A latch member 34 is mounted for movement into and out of engagement with the shoulder to releasably retain the plunger 22 in a cocked position. In accordance with the present invention, the latch member is in the form of an elongated bar having a polygonal cross-section slidably disposed in a complementary opening 35 in the body 16 and arranged to extend substantially radially of the body, intermediate the ends thereof. The inner end of the latch member 34 is beveled as indicated at 36 complementary to the beveled shoulder 33 and is arranged to extend inwardly into the bore 17 in the body into the path of movement of the shoulder. The latch member 34 is yieldably urged inwardly of the body, as by the leaf spring 38 which is anchored by a fastener 39 on the outer side of the body and engages the notch 41 on the outer end of the latch member. The cam surface 36 on the inner end of the latch member and the beveled shoulder 33 are arranged so that the latch member 34 will be cam operated to its release position by the plunger 22 under the bias of spring 27. Provision is made for positively locking the latch member against movement to its release position and for this purpose there is provided a latch lever 43 which is engageable with the outer end of the latch member 34. The latch lever 43 is mounted between spaced ears 44 of a bracket 52 having flanges 45 welded or otherwise rigidly secured to the outer periphery of the body 16. The lever 43 is mounted for pivotal movement on a pin 46 journaled in the ears 44, which pin is preferably disposed in the path of movement of the latch member 34 and extends perpendicular to the longitudinal axis of the latch member. A nose portion 47 is formed on the lever for engagement with the latch member and preferably is formed with a surface 48 for engagement with the end of the latch member, which surface is disposed substantially concentric of the pivot pin 46. The operating lever 43 includes a handle portion 49 which preferably extends alongside the body 16 to permit manipulation by one of the digits of the hand used to grip the impact tool. A leaf spring 51 is also affixed to the body by the fastener 39 and engages the lever 43 to move the latter in a direction to cause the nose portion 47 of the lever to abut the latch member 34. The web of the lever mounting bracket 52 extends between the ears 44 and is engageable with the handle portion of

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the operating lever to provide a stop for limiting movement of the lever by the spring to a preselected position in which the surface 48 on the end of the nose portion of the lever engages the outer end of the latch member.

An annular internal groove 54 is formed in the body 16, adjacent the nose portion thereof and a split ring 55 is disposed in this groove for engagement with the shoulder 33 on the plunger to limit movement of the latter outwardly of the bore.

In use of the impact tool, the plunger 22 is cocked by positioning a block (not shown) against the striking face 25 and then interposing the block and impact tool in a vise or the like with the block against one jaw of the device and the remote end of the impact tool against the other jaw. As the jaws are moved together, the plunger 22 is moved inwardly against the bias of spring 27 and, when the shoulder 33 moves inwardly beyond the latch member 34, the latter is moved by the leaf spring 38 into a position underlying the shoulder. Simultaneously, the latch lever 43 is moved by spring 51 in a counterclockwise direction as viewed in Fig. 1 to move the end 48 of the nose portion 47 against the outer end of the latch member 34. The latch lever 43 then positively retains the latch member in its latching position until the lever is manually operated to release the latch member.

As previously described, the body 16 is dimensioned so as to permit gripping the latter with one hand and the weight of the body is made sufficient to minimize recoil. The body 16, when gripped with one hand, may be manipulated in confined spaces such as under the automobile hood, to position the nose portion 19 of the body in the counterbore 14. The plunger is then released by moving the lever 43 in a clockwise direction to move the nose portion 48 away from the outer end of the latch member. The plunger 22, acting through the beveled shoulder 33 against the beveled surface 36 on the inner end of the latch member, cam operates the latter out of the path of movement of the plunger whereby the latter moves downwardly in the bore 17. The striking face 25 on the plunger is made somewhat smaller than the bore 17 in the body, and smaller than the hole 12 being plugged, so as to engage the central portion of the dome-shaped plug 11 and expand the latter. As is apparent, the device may also be used for removing the loosened expansion plugs by repeatedly using the impact tool to strike the expansion plug and produce an opposite concavity in the plug which diametrically contracts the latter and permits easy removal.

Since the end 48 of the nose portion on the lever 43 is disposed concentric with the pivot pin 46 of the lever, it is apparent that no appreciable movement of the latch member 34 occurs until the nose portion has moved out of engagement with the latch member. Consequently, little effort is required to release the plunger 22, notwithstanding the relatively high pressure which is exerted upon the plunger by the spring 27.

We claim:

1. An impact tool comprising a heavy cylindrical body having a bore extending inwardly from one end thereof, a plunger slidably disposed in said bore and having a striking face at one end, a spring disposed in said bore for urging the plunger in a direction to move the striking face outwardly of said bore, means defining a stop on said plunger, a latch member mounted on said body for movement in a direction transverse to the direction of movement of said plunger into engagement with said stop to retain the plunger in a preselected position in said bore, cam means on said latch member and stop operable under the bias of said spring on said plunger for urging the latch member out of engagement with said stop, and a latch lever mounted on said body and engageable with said latch member for releasably retaining said member in engagement with said stop.

2. An impact tool comprising a heavy cylindrical body

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having a bore extending inwardly from one end thereof, a plunger slidably disposed in said bore and having a striking face at one end, a spring disposed in said bore for urging the plunger in a direction to move the striking face outwardly of said bore, means defining a stop on said plunger, a latch member slidably mounted on said body for movement in a direction transverse to the direction of movement of said plunger into engagement with said stop to retain the plunger in a preselected position in said bore, the inner end of said latch member and said stop having cam surfaces formed thereon and operable under the bias of said spring acting on said plunger for urging the latch member out of engagement with said stop, a latch lever mounted on said body and engageable with said latch member for releasably retaining said member in engagement with said stop.

3. An impact tool comprising a heavy cylindrical body having a bore extending inwardly from one end thereof, a plunger slidably disposed in said bore and having a striking face at one end, a spring disposed in said bore for urging the plunger in a direction to move the striking face outwardly of said bore, means defining a stop on said plunger, a latch member slidably mounted on said body for movement in a direction transverse to the direction of movement of said plunger into engagement with said stop to retain the plunger in a preselected position in said bore, the inner end of said latch member and said stop having cam surfaces formed thereon and operable under the bias of said spring acting on said plunger for urging the latch member out of engagement with said stop, a latch lever pivotally mounted on said body and having a nose portion engageable with the outer end of said latch member for releasably retaining the latter against movement by said cam means out of the path of said stop, said latch lever being movable to disengage the nose portion thereof from the outer end of said latch member whereby said member is moved by said cam means out of the path of said stop and said plunger moves in the bore under the bias of said spring.

4. The combination of claim 3 including a first spring means engageable with said latch member for yieldably urging the member into engagement with said stop, and a second spring means for yieldably urging said latch lever in a direction to move the nose portion thereof into engagement with the outer end of the latch lever.

5. An impact tool for use in confined spaces comprising a heavy cylindrical body dimensioned to be gripped in one hand, said body having a bore extending therethrough, a plunger having an enlarged intermediate portion slidably disposed in said bore, a reduced diameter nose portion extending from one end of said intermediate portion and terminating in a striking face smaller than said bore, a beveled shoulder at the juncture of said intermediate portion and said nose portion, a reduced diameter guide portion extending from the other end of said intermediate portion, a spring disposed in said bore around the guide portion and engageable with said other end of the intermediate portion of the plunger, an abutment threaded into said bore and engaging the other end of said spring for adjusting the pressure on said spring, said body having a radial passage extending therethrough intermediate its ends, a latch member slidably disposed in said passage and having a beveled inner end complementary to said shoulder and engageable with the latter, said beveled shoulder and the beveled inner end of said latch member being shaped so that the spring acting on said plunger is operable to cam actuate said latch member out of engagement with said shoulder, and a latch member pivotally mounted on said body and having a nose portion engageable with the outer end of said latch member for releasably retaining said member in engagement with said shoulder.

6. The combination of claim 5 wherein the pivot axis of said lever overlies the outer end of said latch member, said lever having an operating handle extending

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alongside said body and adapted for manipulation by a digit of the hand used to grip said body.

7. The combination of claim 6 including a first leaf spring engageable with the outer end of said latch member for urging the latter inwardly into engagement with the beveled shoulder, and a second leaf spring on said body for yieldably urging the latter in a direction to move the nose portion of the lever over the end of said latch member.

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