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2,597,103

BODY AND FENDER STRAIGHTENING TOOL

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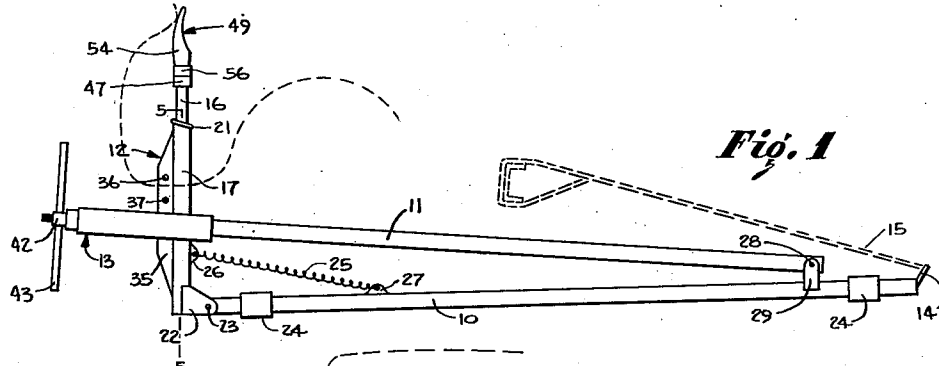


Fig. 1

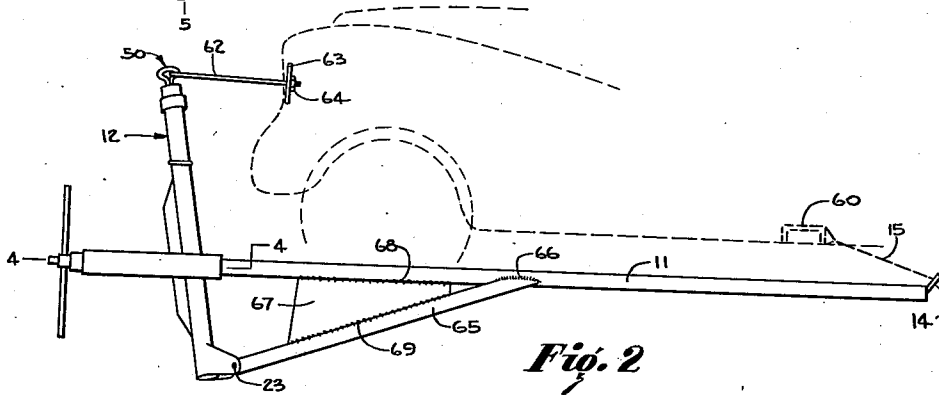


Fig. 2

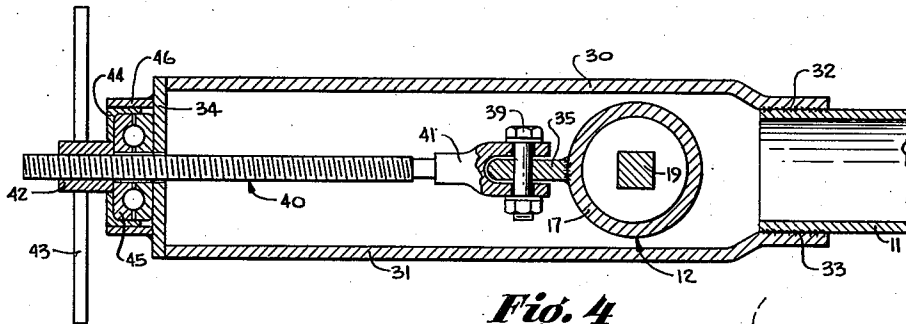


Fig. 4

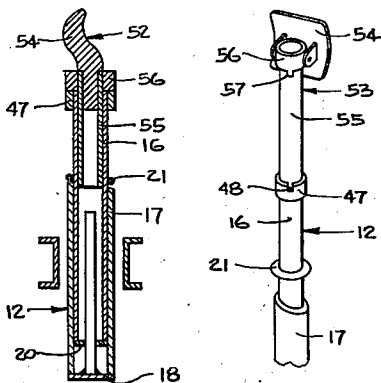


Fig. 5

Fig. 6

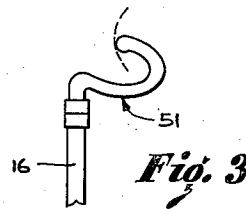


Fig. 3

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BODY AND FENDER STRAIGHTENING TOOL

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This invention relates to a power tool primarily for removing dents from automobile fenders, and for aiding in restoring other bent and damaged parts of a car body to their original shapes by the application of either an outward pushing or pulling force at the points of deformation. The present invention is an improvement over the tool described in our Patent No. 2,442,604 issued to us jointly on June 1, 1948.

A prime object of the invention is to provide a tool which can be positioned in closely restricted spaces beneath or inside a car body, yet which is capable of applying a powerful outwardly directed body straightening force from such position, and of applying that force in practically any desired outward direction.

Another object is to provide a tool which can be positioned near but outwardly spaced from an inwardly dented portion of a car body, and is capable of applying a powerful outwardly directed force to pull the dented body portion out toward its original position.

Other objects are to provide a tool of this type which is self-contained, which does not need to be connected to an air pressure line or to an electric power outlet, and which can be positioned and operated by one man.

Still another object is to provide a tool of this type which is so constructed that the operator can manually control and apply the desired straightening force without changing the direction of that force during its application, or if desired, can change the direction of applied force during its application.

The invention, together with other objects attending its production, will be more clearly understood when the following description is read in connection with the accompanying drawings, in which:

Fig. 1 is a side view of a tool embodying the invention, and illustrates one manner of positioning and anchoring the tool for straightening a dented car fender;

Fig. 2 is a side view of a modified form of the invention, and illustrates another manner of positioning and using the tool;

Fig. 3 is a fragmentary side view illustrating still another way of using the invention;

Fig. 4 is a horizontal sectional view taken along the line 4—4 of Fig. 1;

Fig. 5 is a lateral vertical sectional view taken along the line 5—5 of Fig. 1; and

Fig. 6 is a fragmentary perspective view of the tool showing certain details in its construction.

Referring particularly to the Fig. 1 embodiment,

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it will be seen that the tool generally comprises a base member 10, a compression brace 11, an upright force applying arm 12, and a mechanical advantage unit 13, illustrated in the form of a screw jack. While the member 10 is called a base member, this is an expedient only, and is not meant to infer that the tool must necessarily rest on this base member during use.

The base member 10 has a heavy metal ring or hook 14 welded to one of its ends for receiving and anchoring one end of a chain or cable 15, the purpose of which will be later described. Near each of its ends the base 10 is fitted with annular thick walled non-skid pads 24, preferably of rubber.

The arm 12 is made up of two telescoping thick walled tubes 16 and 17 (see particularly Fig. 5). The lower end of the outer tube 17 is closed by a circular plate 18, welded in position. To the inner surface of this plate is welded one end of a rod 19 which is irregular in cross section, as shown in Fig. 4, and which is centered in the tube.

The lower end of the tube 16 carries a plate 20, welded in position, which has a central aperture which complementally and slidably receives the rod 19. The described structure thus prevents relative rotation of the two tubes 16 and 17, but permits free relative longitudinal movement for overall length variation of this arm unit 12.

A heavy metal ring 21 is fitted rather snugly on the tube 16 before the two tubes are assembled. With the upper end of the tube 17 cut off at an oblique angle, the high side first contacts the ring and causes it to bind the tube 16, preventing further inward movement of that tube. The ring thus serves as a variable stop for maintaining the two tubes in desired relative positions.

Near its lower end the tube 17 is provided with spaced parallel ears 22 (Fig. 1), welded thereon, which have aligned perforations and which straddle one end of the base 10. A pivotal connection between the arm 12 and base 10 is completed by a pin 23, passing through the base 10. A tension spring 25 having its ends anchored to lugs 26 and 27 welded respectively on the tube 17 and on the base 10, serves to urge the tube to pivot toward the base, the object of which will be hereinafter explained.

One end of the compression brace 11 is pivotally connected by pin 28 and spaced ears 29 to base 10. The other end of this brace rigidly carries the jacking unit 13.

Referring more particularly to Fig. 4, the jacking unit includes spaced rigid parallel straps 30 and 31 welded at one end to the end of brace 11,

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as indicated at 32—33. The opposite ends of these straps are rigidly connected together by welding a centrally perforated plate 34 thereto. A guideway is thus formed between these two plates for the pivotal movement of the arm 12.

The tube 17 has a heavy longitudinally disposed rib 35 welded to its exterior surface, as clearly shown in Figs. 1 and 4. This rib is provided with spaced lateral holes 36, 37 and 38, adapted to selectively receive a bolt 39 for pivotally connecting the upright arm 12 to a jack screw 40. This is accomplished by means of a clevis 41 which is rigidly secured on the inner end of the jack screw.

The opposite end of the jack screw projects loosely through the central perforation in the plate 34, and is fitted with a nut 42. This nut is provided with a handle 43, and a rigidly attached bearing housing 44. A thrust bearing 45 is press fitted into the housing 44 and bears directly against the plate 34 to absorb thrust when the jack unit is actuated by rotation of the nut 42. The bearing housing itself is received by and rotates within a dust protector or shield in the form of an outstanding annular collar 46 welded to the exterior of the plate 34.

Referring again to the arm 12 (Figs. 1, 5, and 6), the upper end of the tube 16 is provided with a reinforcing collar 47, the upper edge of which has a plurality of spaced notches 48 (Fig. 6). It will be understood that the upper end of this tube 16 is adapted to receive and hold various types of body contacting inserts, designated as units by the numerals 49 to 53 inclusive in Figs. 1, 2, 3, 5, and 6 respectively. As seen more clearly in Fig. 5, each of these inserts comprises a shoe 54 of the desired configuration, a tubular shank 55 of the proper size to telescope snugly into the tube 16, and a collar 56 rigidly secured on the upper end of the tubular shank. The shoe 54, in each case is non-rotatably secured to the shank by any suitable means, as by press fit or welding, or it may be pivotally attached, as clearly shown in Fig. 6.

Each collar 56 has a depending tongue 57 which may be seated complementally in any one of the notches 48 to prevent the entire insert from rotating with relation to the arm 12 during the application of a straightening force to a part of the car body.

Referring now to the modified embodiment shown in Fig. 2, it will be seen that the base member 10 has been completely eliminated and a different type of pivot supporting means substituted. In this case a heavy rigid tube 65 has one of its ends connected rigidly to the compression member 11, as by welding at 66, and is placed in a divergent position with relation to the member 11. A web of heavy metal plate 67 is then cut to shape and welded along its edges 68 and 69 to the compression member 11 and tube 65, respectively. The outer end of the tube 65 is thus used to support the pivot pin 23. The ring or hook 14 is welded to the end of the compression member 11, as shown, instead of to the base member, as in the previously described embodiment. All other parts are identical to those described in the Fig. 1 embodiment. The chief advantage of the Fig. 2 embodiment lies in its reduced weight and cost. Any other suitable means could be used equally well to support the pivot point 23 in the desired position.

Operation

After the operator has examined the particular

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dent to be removed, he chooses an insert of the desired shape and places it in the upper end of arm 12. The arm is then adjusted to the proper length and the shoe 54 is placed in contact with the dent. One end of a chain or cable 15 is then anchored to the hook 14 and the other end anchored to a fixed part of the vehicle chassis, such as a frame member 60 or 61. It should be noted that it is not necessary for the arm 12 to be in a vertical position. The lower end of this arm may rest on the floor at any oblique angle, or may even occupy a position parallel to the floor if necessary to place the shoe 54 in a position to exert the straightening force in a desired direction. The position of the arm 12 may even be changed by the operator while the straightening force is being applied.

When the tool has been properly positioned, as described, it is only necessary for the operator to turn the nut 42 on the screw 40 to apply the desired force against the dent. The jack forces the arm 12 to pivot outward toward the jack handle until the dent has been pushed outward to the desired position.

In Fig. 2 the tool is shown positioned to pull outward on a rod 62. One end of this rod is hooked into the upper end of the insert 50 while the other end of the rod has been passed through the automobile grille work and suitably anchored, as by a large washer 63 and nut 64.

Having described the invention with sufficient clarity to enable those familiar with the art to construct and use it, we claim:

1. A unitary portable tool adapted to be connected at a first point to a fixed part of a vehicle and to apply a fender or body straightening force at a second point spaced from said first point, comprising: an elongated rigid compression member; and indenture contacting force applying arm located intermediate the ends of said member and disposed crosswise with relation thereto; pivot supporting means connected to and extending outwardly at an acute angle to said compression member to a point adjacent one end of said arm, the pivot supporting means, the compression member and the arm lying in substantially the same plane; a pivot substantially normal to said plane connecting said one end of the arm to said pivot supporting means; mechanical advantage means carried by the compression member and operably connected to said arm at a point spaced from said pivot; and means for anchoring the tool to a fixed part of a vehicle to prevent longitudinal movement of the compression member in a direction opposite that in which the arm is forced to pivot by said mechanical advantage means during application of a straightening force to a body or fender indenture.

2. The invention described in claim 1 in which the said mechanical advantage means comprises a manually operable jack.

3. The invention described in claim 1 in which the said arm is variable in length.

4. The invention described in claim 1 in which the said force applying arm comprises: two rigid tubes telescoped one into the other; and cooperating slidably interfitted means carried by the tubes for preventing their relative rotation regardless of their relative longitudinal positions.

5. The invention described in claim 1 in which that end of the arm opposite its pivot point is provided with an open socket; a rigid work contacting insert for complemental seating in said socket; and interfitted means carried by the

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insert and by the insert receiving socket for preventing relative rotational movement of the two.

6. A unitary portable tool adapted to be connected at a first point to a fixed part of a vehicle and to apply a fender or body straightening force at a second point spaced from said first point, comprising: an elongated rigid compression member; structure forming a longitudinally extending open guideway near one end of said member; a body or fender contacting force applying arm threaded through and movable in said guideway, the ends of said arm projecting outwardly therefrom on opposite sides of said compression member; means connected to the compression member for pivotally mounting one end of said arm on a transverse pivot which is fixed with relation to the compression member; mechanical advantage means mounted on the outer end of the guideway structure and operably connected to said arm at a point spaced from said transverse pivot, and adapted to force said arm to pivot; and means for anchoring the tool to a fixed part of a vehicle to prevent longitudinal movement of the compression member in a direction opposed to the forced pivotal movement of the arm.

7. A unitary portable tool adapted to be connected at a first point to a fixed part of a vehicle and to apply a fender or body straightening force at a second point spaced from said first point, comprising: an elongated rigid base member; an elongated rigid compression member, the two members being positioned in the same plane;

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means connecting one end of one of said members to the other member with the members arranged in an acute angle relationship; a transversely disposed body or fender contacting force applying arm; a lateral pivot connecting one end of said arm to said base member at a point spaced longitudinally from the point of connection of the base member to the compression member; mechanical advantage means carried by the compression member and operably connected to said arm at a point spaced from its pivot, and adapted to force said arm to move about its pivot point; and means for anchoring the tool to a fixed part of a vehicle to prevent longitudinal movement of both the compression and base members in a direction opposed to the forced pivotal movement of the arm during its application of force to an indenture to be straightened.

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