Dec. 9, 1958 G. D. PRIEST 2,863,489

PULLING TOOL FOR STRAIGHTENING FENDERS AND BODIES

Filed Dec. 3, 1956 2 Sheets-Sheet 1

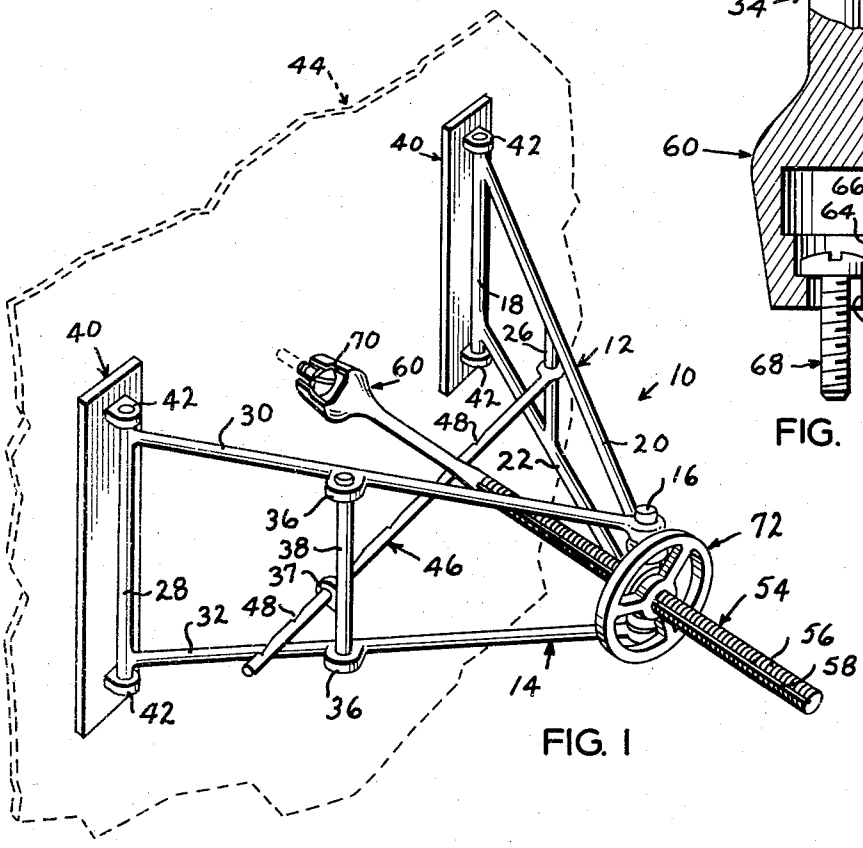

FIG. 1

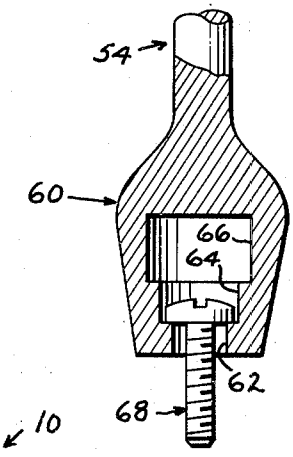

FIG. 5

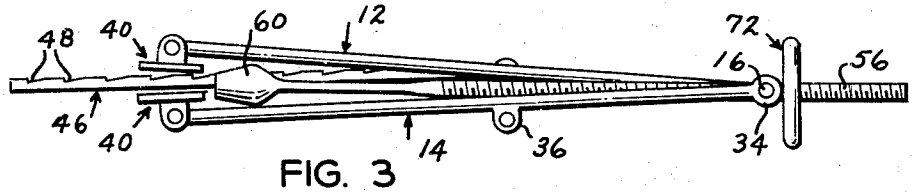

FIG. 3

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PULLING TOOL FOR STRAIGHTENING FENDERS AND BODIES

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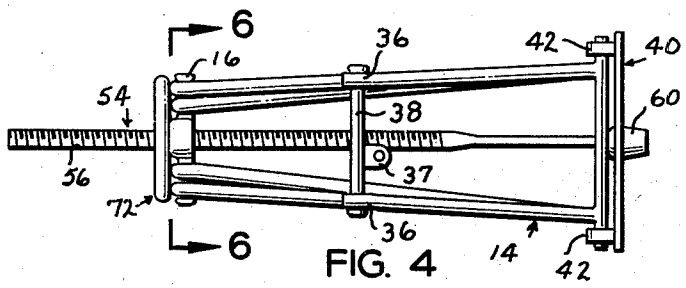

FIG. 4

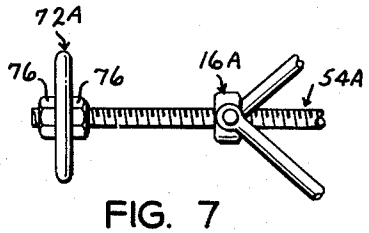

FIG. 7

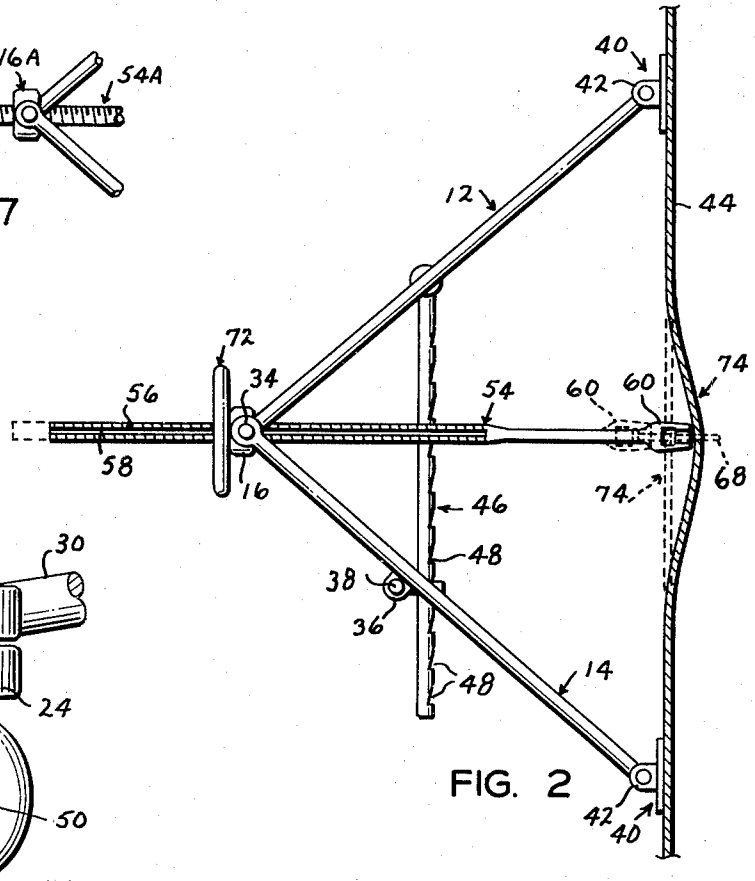

FIG. 2

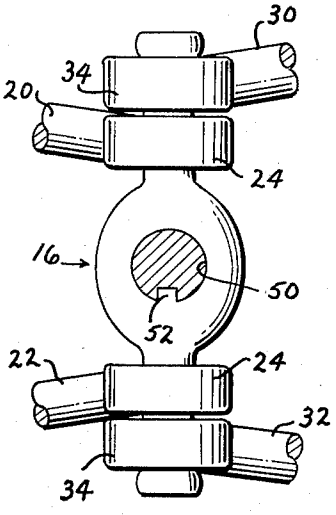

FIG. 6

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PULLING TOOL FOR STRAIGHTENING FENDERS AND BODIES

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6 Claims. (Cl. 153—38)

The present invention relates to hand tools, and more particularly to a device for straightening deformed sheet metal panels on an automobile or the like.

Automobile bodies are so constructed that in many instances it is difficult, requiring the dismantling of a number of sections of the body construction, to gain access to the inward side of a portion of a sheet metal panel to hammer or straighten out a deformation of the panel. For example, a dent in a door panel requires the removal of the material connected to the inner side of the door to bare the inner side of the metal forming the outside of the door. Thus, the repairing of such a "blind spot" in this manner necessarily increases the cost of automobile body repair work.

It is therefore the principal object of this invention to provide a hand tool for straightening deformed sheet metal panels located over "blind spots."

One method of repairing such blind spots has been to cut a hole in the deformed area sufficiently large enough to permit the entry of body-forming tools to grasp the inner surface of the deformation and pull the same back into alignment. Thereafter, the hole must be filled in, as by welding, and the excess metal ground off to present a neat appearance. This type of repair is resorted to only when it is impractical to gain access to the inward side of the panel.

In most instances it requires only a relatively small force applied in the proper position to cause a deformation in a sheet metal panel to spring back into the plane of the balance of the panel.

A similarly important object of this invention is to provide a hand tool which may be positioned over a dent in a sheet metal panel and by which a force in the form of a pull may be applied at a selected point to straighten out the dent.

An additional object is to provide a hand tool of this class which is easily and readily adjustable to centrally position the tool over a dent in a panel of almost any configuration.

A further object is to provide a hand tool of this class which requires only a relatively small hole to be drilled into the sheet metal for straightening the same, and which hole may be easily filled in.

Still another object is to provide a hand tool of this character which is interconnected so that none of the parts thereof will be removed and misplaced.

Yet another object is to provide a device of this class which is easily collapsible into a relatively small area and is therefore easily stored or placed within a tool box.

The present invention accomplishes these and other objects by providing an A-frame having the legs thereof pivotally joined together at the apex of the frame. A cross member extends between the legs for adjusting the spacing between the legs. Base plates are pivotally connected to the base of each of the legs for supporting the frame on a sheet metal panel. A shaft slidably carried by the apex of the A-frame bisects the same and projects outwardly from the apex thereof. The inwardly disposed end of the shaft is provided with a recess for receiving a screw head therein. A crank wheel is threadedly carried by the outwardly disposed end of the shaft adjacent the apex of the frame.

Other objects will be apparent from the following description when taken in conjunction with the accompanying two sheets of drawings, wherein:

Figure 1 is a perspective view of the device in operating position on a fragment of a sheet metal panel, the panel being shown in dotted lines;

Figure 2 is an elevational view of the device as seen in Fig. 1;

Figure 3 is an elevational view of the device when in folded or collapsed position;

Figure 4 is an end view of the device, per se;

Figure 5 is a fragmentary vertical sectional view, partly in elevation, of the rceessed end of the shaft;

Figure 6 is a fragmentary top view of the apex of the A-frame taken substantially along line 6—6 of Fig. 4; and,

Figure 7 is a fragmentary elevational view illustrating an alternate manner of connecting the crank wheel to the shaft.

Like characters of reference designate like parts in those figures of the drawings in which they occur.

In the drawings:

The reference numeral 10 indicates the device, as a whole, comprising a pair of legs or leg-frames 12 and 14 pivotally joined together at one end by a hinge pin 16 for substantially defining an A-frame. The leg 12 is preferably rigidly formed of rod-like material substantially describing a triangular shape having a base portion 18 and upwardly converging sides 20 and 22 terminating in transversely perforated loop ends 24 for receiving the hinge pin 16 therethrough. Intermediate their ends the sides 20 and 22 are rigidly connected by a transversely disposed first brace 26, for the purposes which will presently be apparent. The leg 14 is substantially similarly formed triangularly with relation to the leg 12 having a base 28 and upwardly converging sides 30 and 32 terminating at their upper ends in transversely perforated loop ends 34 for receiving the hinge pin 16. Thus, either or each of the legs 12 and 14 is free to be pivotally moved about the hinge pin axis 16 or, when the legs 12 and 14 are stationarily positioned, the pin 16 may pivot within the loop ends 24 and 34. Intermediate their ends the sides 30 and 32 of the leg 14 are provided with a pair of integral outwardly projecting alignedly perforated lugs 36 for pivotally receiving a second transverse brace 38. A laterally projecting transversely perforated ear 37 is integrally carried by the second brace 38 intermediate its ends, for the purposes which will presently be apparent.

A substantially flat rectangular base member 40 is pivotally connected longitudinally to each of the base portions 18 and 28, respectively, by laterally extending projections of the respective base portions inserted into alignedly perforated bosses 42 carried by the base members 40. The purpose of the base members 40 is to provide a larger supporting area for the base ends 18 and 28 of the legs when applied to the surface of a sheet metal panel 44.

A rod-like cross member 46 is pivotally connected at one end to the first brace 26 intermediate its ends and has its free end portion slidably disposed through the aperture or perforation in the ear 37. The cross member 46 is further provided with a series of longitudinally spaced-apart notches or recesses 48 defining a series of transverse shoulders for engagement with the ear 37 to adjustably fix the spacing between the legs 12 and 14 as desired.

Intermediate its ends the hinge pin 16 is provided with

a transverse bore 50 having a key 52 projecting inwardly of the bore, for the purposes disclosed hereinbelow.

An elongated shaft 54 having an exteriorly threaded end portion 56 has the threaded end thereof slidably disposed within the bore 50 of the hinge pin. A longitudinal key-way slot 58 formed in the periphery of the threaded portion of the shaft slidably receives the key 52 and prevents rotation of the shaft relative to the hinge pin 16 during operation, more fully explained hereinbelow. As shown in Figs. 1 and 2, the shaft 54 substantially bisects the A-frame, but the inwardly disposed free end 60 of the shaft may be moved toward the base of either of the legs 12 or 14 by the pivoting of the hinge pin. The length of the shaft is substantially greater than the height of the legs 12 and 14 forming the A-frame, so that a portion of the threaded end 56 projects outwardly from the apex or hinge pin of the A-frame. The inwardly disposed end portion 60 of the shaft is circumferentially enlarged and provided with a central bore 62 and concentrically enlarged sockets 64 and 66 for receiving a metallic screw 68 therein. The two sockets 64 and 66 permit the reception of different sized screws therein. A lateral opening 70 is formed in the wall of the end portion 60 for inserting the head of the screw 68 into the proper socket.

A crank wheel 72 having a central threaded bore is threadedly engaged with the threaded portion 56 of the shaft adjacent the apex of the A-frame.

Operation

In operation a small hole is drilled at a selected point in a dent or deformation 74 in a sheet metal panel (Fig. 2). A metallic screw 68, of a selected size, is then inserted into the drilled hole in the panel. The device 10 is adjustably positioned over the dent 74 and the socket 64 of the shaft is engaged with the head of the screw 68. Manual rotation of the crank wheel 72, bearing against the hinge pin 16, moves the shaft outwardly through the bore 50 of the hinge pin and transmits a pull to the sheet metal for urging the same into the proper plane of the sheet metal, as shown diagrammatically by dotted lines in Fig. 2.

An alternate arrangement of the crank wheel is shown in Fig. 7, in which the shaft 54A is threadedly connected through the hinge pin 16A and the crank wheel 72A is rigidly positioned adjacent the outwardly disposed end of the shaft by lock nuts 76. Thus, the shaft 54A is longitudinally moved through the hinge pin 16A in the desired direction by rotating the shaft 54A.

When the device 10 is not in use, the free end portion of the cross member 46 may be removed from engagement with the ear 37, and the device then folded or collapsed as shown in Fig. 3.

Obviously the invention is susceptible to some change or alteration without defeating its practicability, and I therefore do not wish to be confined to the preferred embodiment shown in the drawings and described herein, further than I am limited by the scope of the appended claims.

I claim:

1. A sheet metal straightening hand tool, comprising: an A-frame having the legs thereof pivotally joined together at the apex of the frame, each of said legs formed of rod-like material for defining a substantially triangular shaped leg-frame converging upwardly from the base thereof toward the juncture of the legs, the base side of said triangular shaped leg-frames forming parallel panel engaging surfaces; a first brace-member extending transversely between and rigidly connected to the sides of one of said triangular shaped leg-frames; a second brace-member extending transversely between and pivotally connected to the sides of the other one of said triangular shaped leg-frames; a perforated ear integrally carried laterally by said second brace-member intermediate its ends; a cross member pivotally connected at one end to said first brace-member, the free end portion of said cross member slidably disposed within the perforation of said ear, said cross member having a series of longitudinally spaced-apart recesses in its periphery forming a like series of transverse shoulders engageable with the outwardly disposed surface of said ear for rigidly holding the legs of said A-frame in predetermined spaced-apart relation; a shaft bisecting said A-frame and slidably connected to said legs adjacent their juncture and projecting outwardly therefrom, the length of said shaft being greater than the height of the A-frame, whereby the inwardly disposed end of said shaft may extend beyond the plane of the lower end of said legs, the inwardly disposed end of said shaft having a recess adapted for receiving a screw head; and a crank wheel threadedly engaged with the outwardly extended end of said shaft and frictionally contacting the apex of said A-frame, whereby manual rotation of said crank wheel in one direction draws the inwardly disposed end of said shaft toward the apex of said A-frame.

2. Structure as specified in claim 1, and a base plate pivotally connected longitudinally to the base side of each of said triangular shaped leg-frames, respectively, for supporting said A-frame on a sheet metal panel.

3. A sheet metal straightening hand tool, including: an A-frame; a transverse hinge pin pivotally joining the legs of said A-frame at its apex, whereby the legs of said A-frame may be adjustably positioned in spaced-apart relation said hinge pin having a transverse central perforation; a cross member extending between the legs of said A-frame, said cross member pivotally connected at one end to one of said legs intermediate its ends, the other one of said legs having an aperture intermediate its ends, the end portion of said cross member opposite said pivotally connected end being loosely received by the aperture in said one leg, the free end portion of said cross member having a series of transverse shoulders engageable with the surface of said one leg adjacent the aperture for holding said A-frame legs in selected spaced-apart relation; a shaft bisecting said A-frame, said shaft having one threaded end portion slidably received by the perforation in said hinge pin and projecting outwardly from the apex of said A-frame, the end of said shaft opposite said threaded end portion having a central screw head receiving recess, the length of said shaft being greater than the distance between the base and apex of said A-frame; and a crank wheel threaded with the outwardly extended threaded end portion of said shaft adjacent said hinge pin, whereby manual rotation of said crank wheel in one direction moves the recessed end of said shaft toward the apex of said A-frame.

4. Structure as specified in claim 3, and a base plate pivotally connected transversely to the free end of each of said A-frame legs, respectively, for supporting said A-frame on a metal panel.

5. A sheet metal straightening hand tool, including: a pair of rigid substantially triangular shaped leg-frames; a hinge pin pivotally joining said leg-frames at one end for forming an adjustable A-frame, said hinge pin having a transverse central perforation; a cross member extending between said leg-frames and being pivotally connected at one end to one of said leg-frames intermediate its ends, the other one of said leg-frames having an aperture intermediate its ends for loosely receiving the free end of said cross member, the free end portion of said cross member having a series of transverse shoulders engageable with the surface of said one leg-frame adjacent its aperture for adjustably holding the free ends of said leg-frames in spaced-apart relation; a shaft bisecting said A-frame, said shaft having one threaded end portion slidably received by the perforation in said hinge pin and extending outwardly therefrom, the end of said shaft opposite said threaded end having a central screw head receiving recess, the length of said shaft being greater than the length of said leg-frames; and a crank wheel thread-

edly engaged with the outwardly extended end of said shaft and bearing against said hinge pin, whereby manual rotation of said crank wheel in one direction moves the recessed end of said shaft toward said hinge pin.

6. Structures as specified in claim 5, and a base plate pivotally connected transversely to the free end of each of said leg-frames, respectively, for supporting said A-frame on a sheet metal panel.

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