July 8, 1952 J. A. LILE 2,602,358

TOOL FOR REMOVING DENTS FROM SHEET METAL

Filed April 13, 1950

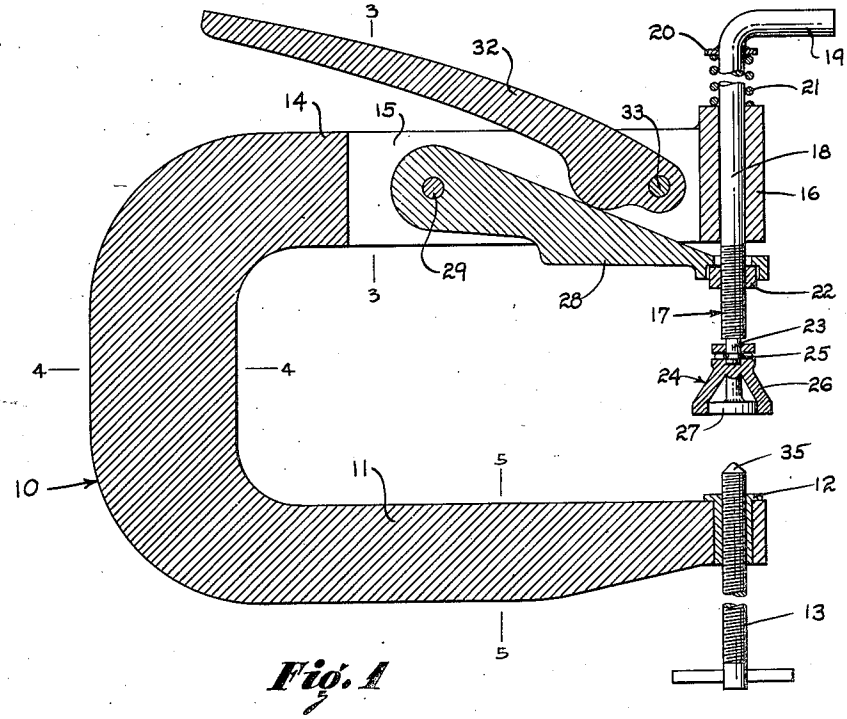


Fig. 1

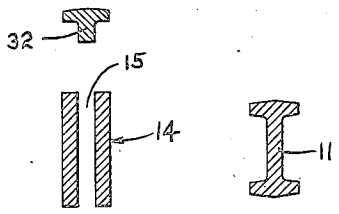


Fig. 3 Fig. 5

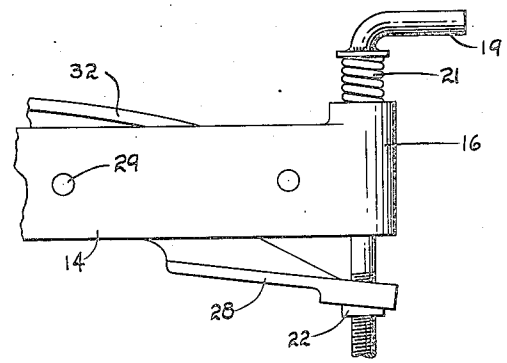


Fig. 2

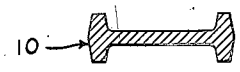


Fig. 4

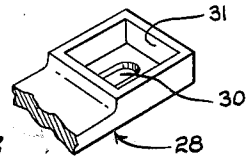


Fig. 6

JOHN A. LILE
Inventor

By Hubert Miller
Attorney

Patented July 8, 1952 2,602,358

UNITED STATES PATENT OFFICE

2,602,358

TOOL FOR REMOVING DENTS FROM SHEET METAL

John A. Lile, Wichita, Kans.

Application April 13, 1950, Serial No. 155,619

1 Claim. (Cl. 81—15)

1

This invention relates generally to a hand tool and more particularly to a tool designed for the use of automobile body repair men in removing dents from fenders and other vehicle body parts.

The principal object of the invention is to provide a tool of this class in which the dent removing force is applied to opposite surfaces of a dented sheet of metal by means of a ring and a concentric punch, the force being applied by the movement of one of these tool elements toward the other along a straight line coinciding with the axis of the punch.

Another object is to provide simple yet powerful mechanical advantage means, including a hand actuated lever, for forcing one of the above mentioned tool elements toward the other along their common axis.

Still another object is to provide a tool capable of removing dents located inward a considerable distance from the edge of a sheet of metal.

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, which illustrate a preferred embodiment.

In the drawings:

Fig. 1 is a longitudinal sectional view through the tool;

Fig. 2 is fragmentary side view of certain parts shown in Fig. 1, and illustrates the straight line movement of one of the pressure applying elements of the tool;

Figs. 3, 4, and 5 are sectional views taken along the lines 3—3, 4—4, and 5—5, respectively, of Fig. 1; and

Fig. 6 is an inverted fragmentary perspective view of one of the tool parts shown in figure, and shows details of construction.

The tool illustrated includes a rigid U-shaped frame 10, the parallel legs of which will vary in length in different tools, depending upon the distance between the dent to be removed and the nearest edge of the metal sheet in which the dent is located.

One leg 11 of this frame is provided with a press fitted internally threaded steel sleeve 12 which receives an axially adjustable, threaded pressure applying element 13, in the form of a steel punch.

The other frame leg 14, is longitudinally slotted, as at 15, and its outer end is cylindrical, as at 16, and provided with a longitudinal bore which is concentric and in alignment with the threaded bore of the sleeve 12. A second pressure applying element, designated as a whole by the numeral 17, is slidably reciprocable in the bore in sleeve 16.

2

The pressure applying element 17 includes a threaded steel rod 18, a handle 19 for rotating the rod, a washer 20 welded near one end of the rod as an abutment for a rod encircling compression spring 21, a nut 22 on the threaded portion, a reduced diameter annularly grooved end 23, and a removable work contacting element 24, which will hereinafter generally be referred to as a ring, because that is the shape of that portion of the element which actually contacts the work surface.

The element 24 has a concentric blind bore in its smaller end to receive the grooved end 23 of the rod 18. This smaller end is provided with oppositely positioned transverse grooves which communicate with opposite sides of the blind bore. A U-shaped spring clip 25 of round spring wire has its two legs seated in the mentioned transverse grooves, and a portion of each of its two spring legs thus partially obstruct this blind bore. When the grooved end 23 is forced into the blind bore the two legs of the spring clip are forced apart slightly, and as further penetration occurs the legs spring inward to seat in the annular groove, thus serving to hold the element 24 in position on the small end 23 of the rod 18. Removal of the element 24 is accomplished by simply pulling it away from the rod end.

This working contacting element 24 includes integral circumferentially spaced diverging arms 26, and an integral work contacting ring 27. The entire element 24 will hereinafter be referred to as a ring, primarily because it will greatly simplify the wording of the claims.

As a means of forcibly moving the entire pressure applying element 17 toward the punch 13, a lever 28 is pivotally mounted at 29 between the two walls of the frame leg 14. Its free end is provided with a slot 30 (Fig. 6), wide enough to loosely receive the rod 18, and a surrounding nut seat 31 which complementally but loosely receives the nut 22.

A second lever 32 is also pivotally mounted in the slot 15 at 33. On its nether surface the lever 32 is provided with an arcuate cam, which cams the upper surface of lever 28, when the outer or free end of cam lever 32 is depressed. Such cam action transmits movement to the outer or free end of lever 28, and downward pressure is thus applied to the nut 22, and the rod 18, which forces the ring 27 to move toward the punch 13 against the action of spring 21. Such relative movement of the mentioned parts is clearly shown in Fig. 2.

In removing a dent from a fender or other sheet of metal the tool is manipulated to cause the edge of the metal sheet to pass into the space between the frame legs 11 and 14. The ring 27 is then positioned adjacent or over the concave surface of the dent and the lever 32 manually depressed. The opposing action of the ring 27 and of the punch 13 forces the convex surface of the dent back toward its original position. By slight changes in the position of the ring and punch, and by repeated applications of pressure in the manner above described, most any dent can be flattened out. It should be noted that the mechanical advantage supplied by the levers 28 and 32 is considerable, and that ample dent removing pressure can be obtained at the ring and punch by the grip of one hand on the free end of lever 32 and on the frame leg 14.

The diameter of ring 27 will vary with the size of the dent to be straightened. Also the shape of the inner end 35 of the punch can be varied to obtain the desired surface contacting area.

It should also be noted that by turning the handle 19 the position of work contacting ring 27 can be changed with relation to punch 13. Similarly by rotating punch 13, the position of its working contacting end 35 can also be changed. Thus the location at which the two work contacting elements actually contact the work can be selectively varied to suit the contour of the sheet metal part containing the dent.

Having described the construction and operation of one embodiment of the invention with sufficient clarity to enable those familiar with this art to construct and use it, I claim:

A portable pressure applying tool for flattening dents in sheet metal comprising: a rigid U-shaped frame having first and second legs; coaxial bores in the respective free ends of the two legs of said frame, the bore in the first leg being threaded and the bore in the second leg smooth; a first work contacting member in the threaded bore of the first leg and extending adjustably into the throat of said frame; a slot in the second leg extending longitudinally from a point near the free end of the leg to a point near the closed end of the frame; a second work contacting member reciprocable in the bore of the second leg and extending into the frame throat for cooperation with the said first work contacting member; threads and a nut on the throat located end of said second work contacting member; a lever having one end pivotally mounted in the slot in the second leg of the frame at a point near the closed end thereof, and its other end surrounding the threaded portion of the second work contacting member and bearing against the outer surface of said nut between the nut and the adjacent frame leg; a lever actuating handle having one end pivotally mounted between the walls of said slot at a point near the bore in said second leg, the free end of said handle extending outward from the frame leg and toward the closed end of the frame: an integral cam carried by said handle and engaging the outer surface of said lever at a point intermediate its ends, whereby when the free end of said actuating handle is moved toward the frame force is transmitted through the cam to the lever, and the nut contacting end of the lever forces the second work contacting member to move axially toward the first work contacting member; and a compression spring urging the second work contacting member in the opposite direction.

JOHN A. LILE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
318,221	Thompson et al.	May 19, 1885
1,443,075	Guilford	Jan. 23, 1923
1,560,748	Wilderson	Nov. 10, 1925
1,880,246	Greiner	Oct. 4, 1932
1,940,736	Anderson	Dec. 26, 1933
2,148,943	Hauschild	Feb. 28, 1939
2,292,625	Fellers	Aug. 11, 1942
2,320,074	Golnick	May 25, 1943