

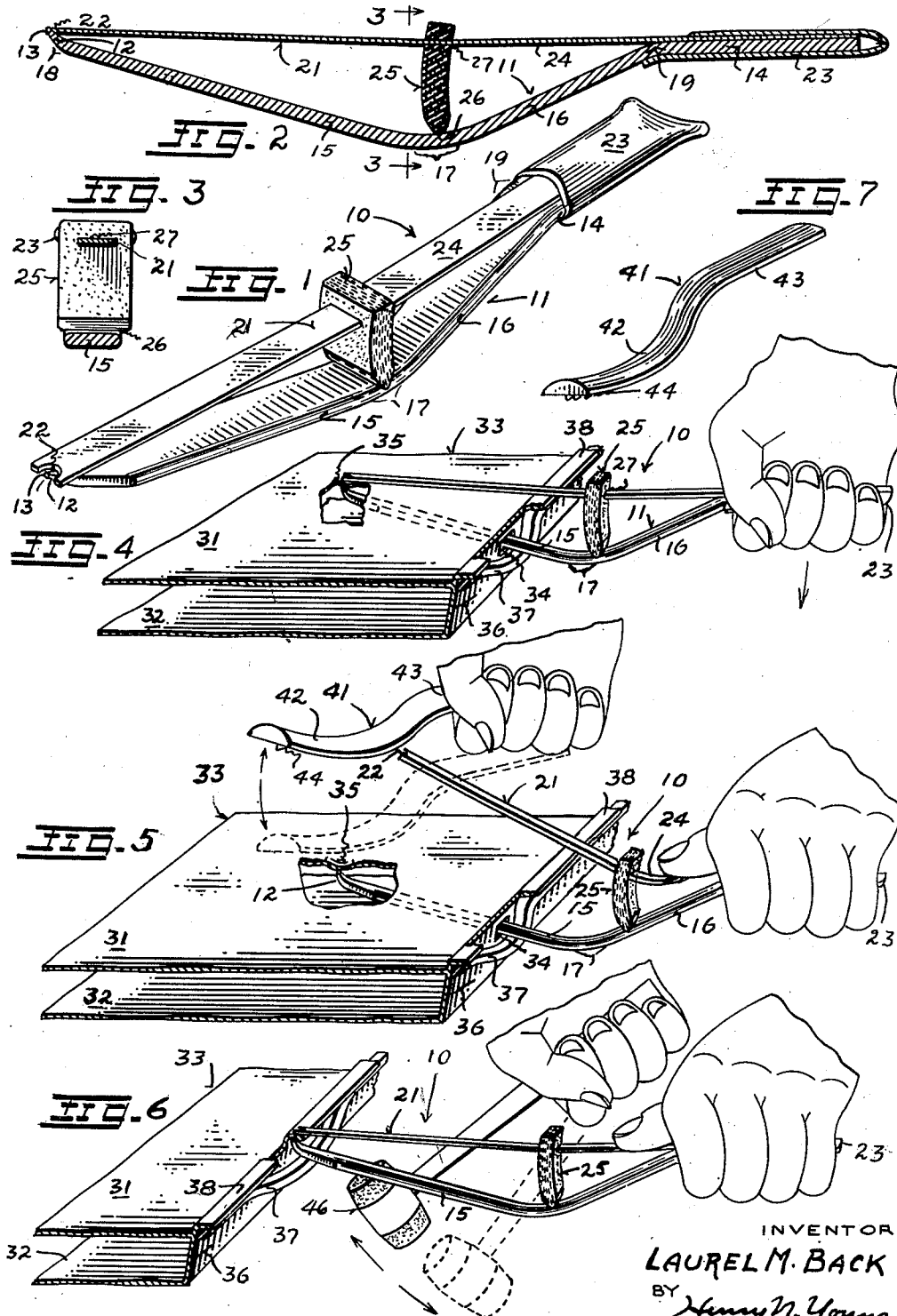
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DENT-REMOVING TOOL

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DENT-REMOVING TOOL

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3 Claims. (Cl. 81-15)

The invention relates to a hand tool for a flattening-out removal of dents from elements of sheet material comprising parts of fabricated structures.

An object of the invention is to provide a dent-removing tool which is particularly adapted for removing dents at points of sheet members which are visible from only their concave, or indenture, sides.

Another object is to provide a dent-removing tool which has a particularly simple and effective sighting finger for an applied positioning of the working point of the head element of the tool with reference to a dent.

A further object is to provide a tool of the character described in which the indicator end of the sighting finger is arranged for ready displacement from its operating position after the tool has been positioned for its working application to a dent.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth, or be apparent, from the following description of an embodiment thereof, and in the accompanying drawing, in which,

Figure 1 is a perspective view of a dent-removing tool embodying the features of my invention.

Figure 2 is a longitudinal mid-section of the tool.

Figure 3 is a sectional view taken at line 3-3 in Figure 2.

Figures 4 and 5 and 6 are perspective views illustrating various working applications of the tool.

Figure 7 is a perspective view showing a separate hammer of the "slapping tool" type which is usable with the present dent-removing tool in certain applications thereof.

As particularly shown, the features of the present invention are incorporated in the structure of a unitary tool 10 comprising a rigid arm element 11 providing a working head portion 12 and a handle portion 14 at its opposite ends, a resiliently flexible finder finger element 21 carried by the handle portion 14 of the arm for a sighting use in operatively positioning the tool and normally extending along the arm 13, and a fulcrum element 25 mounted on the finger and cooperative between it and the arm 13 for effecting a non-operative disposal of the working end of the finger. The illustrated arm element 11 is preferably of the one-piece structure shown, and is shaped from a metal bar which is of uniform rectangular cross-section therealong except for its forward end portion which is laterally and transversely tapered symmetrically to provide the working head 12 which terminates at the working point 13, and must be relatively rigid for various working applications thereof.

The handle portion 14 of the present arm 11 is straight, and the working point 13 of the head 12 is particularly shown as lying in the plane of this arm portion. An intermediate arm portion has angularly related parts 15

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and 16 which are mutually joined at an obtuse-angle bend 17 and are integrally connected to the head and handle portions 12 and 14 at bends 18 and 19 respectively. The arm structure is essentially such that the handle parts 15 and 16 generally comprise the sides of an obtuse triangle based on a straight line extending from the head point 13 to the midpoint of the bend 19, and the arm portion 15-16 is transversely offset with respect to a plane including said line and the line of the bend 19 and is generally arched away from said plane and line. Preferably, and as shown, the length of the forward arm part 15 is substantially twice that of the arm part 16. Also, the bends 17 and 18 and 19 are preferably rounded to provide a maximum arm stiffness thereat.

It will now be noted that the finger element 21 comprises a resiliently flexible and relatively thin and uniform strip of spring metal or the like which is narrower than the bar of the arm and has its rear portion fixed flat against the handle portion 14 of the arm for a normal extension of the finger to the point 13 of the working head generally as a chord for the offset arm portion provided by the bar parts 16 and 17. At its forward end, the finger 21 is provided with an open transverse sighting notch 22 of more or less semi-circular form having the center of its chord aligned with the working point 13 of the head 12 when the tool is unapplied, as in Figure 2. The present normally aligned relation of the finger extremity to the working point of the head is important because it provides for the working application of the tool head with respect to a dent immediately adjacent a partition or wall which is transverse to a workpiece sheet or plate at either side thereof. The engaged rear end parts of the arm 11 and finger 21 may be fixed together in any suitable manner; as particularly shown, a tubular metallic member 23 closely receives said arm and finger portions and is transversely flattened against the portions to unitarily secure it and said portions together, the member 23 providing the handle grip.

For a reason which will be hereinafter brought out, it will sometimes be desirable for a most efficient use of the present tool to at times displace the indicator end of the finger 14 from the immediate vicinity of the working head 11 of the arm, and the element 25 provides for such a control of the finger 21. As particularly indicated, the element 25 comprises a generally rectangular block of rubberized fabric material having one edge portion tapered to provide a bearing edge 26 therealong, and is provided with a transverse rectangular opening 27 therethrough adjacent and parallel to its edge opposite the bearing edge 26 and arranged to slidably receive the finger 21 in frictional engagement therein whereby the element 25 may be frictionally held in longitudinally adjusted position along the finger. When the bearing edge 26 of the element 25 is disposed opposite the arm bend 17 at the juncture of the arm portion 15 and 16, the sighting notch 22 at the free end of the finger 21 may receive the working point 13 of the head 12, as in Figures 1 and 2, appropriate adjustment of the element 25 along the finger being permitted to meet this condition. While the element 25 is particularly shown as slidably and adjustably mounted on the finger 21, it will be understood that a similar element might be slidably mounted on the arm element 11 adjacent the bent 17 with its free bearing edge engaging the finger to provide a fulcrum for the same finger-deflecting action.

Should it be desired to temporarily space the index end of the finger 21 from the point 13, it is merely necessary

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to forcibly apply the thumb of a hand grasping the grip 23 to the finger portion 24 between the element 25 and the handle grip to flex the finger portion 24 toward the arm portion 17 and so swing the notch end of the finger away from the working head of the tool to thereby provide free access to the workpiece at the concave side of the dent; such an inoperative disposal of the finger is indicated in Figure 5. If, on the other hand, a continued spacing of the free finger end from the head 12 is desired, the latter may be readily effected by shifting the element 25 along the finger 21 toward the handle. Understanding that a dented workpiece sheet must be disposed between the forward arm and finger ends for a sighted positioning of the tool, said ends may be separated by described control means for facilitating a placement and removal of the tool with respect to an operative position thereof. Also, a disposal of the finger end away from the workpiece while the head engages the convex dent side permits the direct application of a suitable anvil or hammer member against the workpiece face at the concave dent side; Figure 5 illustrates the working application of a "slapping tool" 41 against a workpiece side while the finger point is spaced from a workpiece engaged by the tool head at its opposite side.

It will now be noted that the present tool has been particularly designed for the application of its working head 12 to a dent in one of the opposed sides 31 or 32 of a relatively thin hollow structure, such as that of the fragmentarily shown vehicle door 33, from an edge opening 34 thereof to operatively dispose the point 13 of the working head 12 against the convex face of a dent portion 35 of the side 31 which comprises a workpiece for the working application of the present tool. The opening 34 may be an already existing opening in the door structure, or may be provided especially by cutting a special "window" through the door edge 36; as particularly illustrated in Figures 4 to 6, a resilient sealing strip 37 mounted in the corner between the door edge 36 and its edge flange 38 has been pushed to one side for the provision and use of a special tool-applying "window" opening, and the subsequent concealing of the opening by the replaced strip after the tool has been used for avoiding a necessity for replacing any material removed to provide the opening. In the case of vehicle doors, openings already existent may be used for working applications of the present tool therethrough, reference being made to drainage openings and lock openings in the edges of such doors, and to the window openings in the door sides.

A typical working application of a present tool 10 is illustrated in Figure 4 in which the forward arm portion 15 is shown as inserted through an opening 34 to position the point of the head 12 against the convex side of a dent 35 at an interior point in the plate 31. Having the head point appropriately engaged with the dent, the head may be forcibly applied by rocking the arm as a lever against the edge of the opening 34 which is furthest from the plate 31 to urge and effect a flattening-out of the engaged dent, the free finger extremity then serving solely to indicate the point of application of the head. This type of working application of the present tool is a particularly important feature of the tool.

Particularly in the event that a dented plate 31 is too stiff for a ready flattening of a dent therein by solely a lever use of the tool arm element 11, the forward portion of the finger element 21 may be moved away from the plate 31 to provide for the working application of a striking tool against the indented side of the plate 31 while the head of the present tool is forcibly held against the convex dent side. As particularly illustrated in Figure 5, the working application of a slapping tool 41 is indicated, for supplementing the lever application of the arm 11. The present slapping tool 41 is in common use in the working of sheet metal, and is formed of a length of a metal bar of segmental cross-section to provide head and handle portions 42 and 43 which are transversely off-

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set at an intermediate point of the tool to provide the handle portion in outwardly spaced relation to the plane of the flat working face 44 of the head portion. A present slapping tool 41 has the flat working face 44 of its head portion 42 applied against the dented plate portion either obliquely or transversely for cooperating with the positioned tool head 12 to flatten a dent engaged by it.

In some cases, a present tool 10 may not have its head 12 operatively applied by a lever application of the arm 11, as for removing a dent from the present door edge flange 38, as is indicated in Figure 6. In such a case, the point of the tool head is applied and held against the convex side of the dent by an operator's hand grasping the tool handle and a suitable mallet 46 may be swingingly applied against the arm portion 15 to actuate the more or less inaccessible head to provide the desired flattening action at the dent. The possibility of this present type of application of the tool without requiring the use of a fixed fulcrum is understood to appreciably expand its utility as a dent-removing tool which may be effectively used for flattening out dents in sheet metal elements generally, whether such elements are parts of relatively thin double-walled structures such as doors or deck lids or hatches or vehicle bodies, or occur as separate elements.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the present dent-removing tool will be readily understood by those skilled in the art to which the invention appertains. While I have described the structure and use of a form of the invention which is now considered to comprise a preferred embodiment thereof, I desire to have it understood that the disclosure is primarily illustrative, and that such changes and developments may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In a tool for removing a dent from a workpiece of sheet material, a rigid arm element providing a working head at its forward end for application against the convex side of a dent in the workpiece while the arm extends along the workpiece at the convex side of the dent, a handle extending rigidly and rearwardly from the arm, a tool-positioning finger element of yielding resilient material carried by the handle to normally extend therefrom along a line joining the head and rear ends of the arm for the reception of the workpiece between it and the arm and having its free extremity providing an index means for normal disposal opposite the working head for its reference use to operatively position the working head with respect to the dent in the workpiece, and a fulcrum member mounted intermediately on one of the opposed finger and arm elements forwardly of the handle and providing a fulcrum for engagement by the other element for effecting a swinging of the finger portion forwardly thereof angularly away from the operative line of the finger when the portion of the finger element between the fulcrum edge and handle is bowed toward the opposed arm portion.

2. A structure in accordance with claim 1 having the fulcrum member arranged for its longitudinal adjustment along the element which carries it.

3. In a tool for removing a dent from a workpiece of sheet material, a rigid arched arm providing a working head at its forward end for application against the convex side of a dent in the workpiece while the arm extends along the workpiece at the convex side of the dent, a handle extending rigidly and rearwardly from the arm in line with the chord of its arch, a flat tool-positioning finger element of yielding resilient material carried by the handle to normally extend therefrom along the line of said chord and transversely of the plane of the arm and chord for the reception of the workpiece between it and the arm and having its free extremity providing an index point for normal disposal opposite the working head for its reference use to operatively position the work-

ing head with respect to the dent in the workpiece, and a fulcrum member mounted intermediately on one of the opposed finger and arm elements forwardly of the handle and providing a fulcrum edge for engagement by the other element for effecting a swinging of the finger portion forwardly thereof angularly away from the operative line of the finger when the portion of the finger element between the fulcrum edge and handle is bowed toward the opposed arm portion.

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