Feb. 8, 1944. W. H. FERGUSON 2,340,950

SHRINKING DOLLY BLOCK

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Fig. 1.

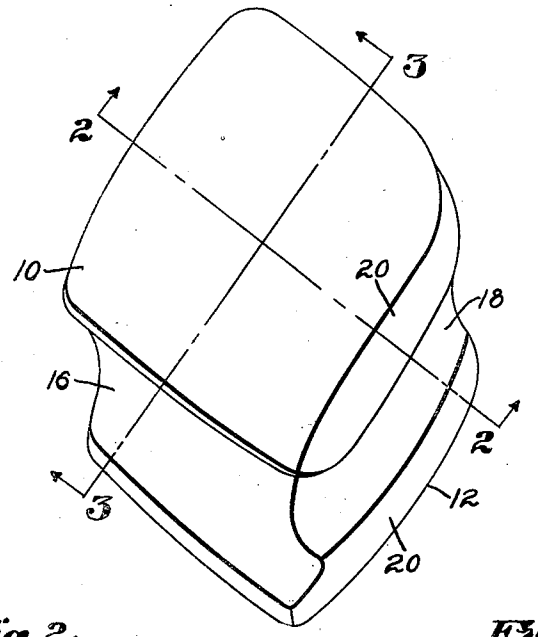


Fig. 2.

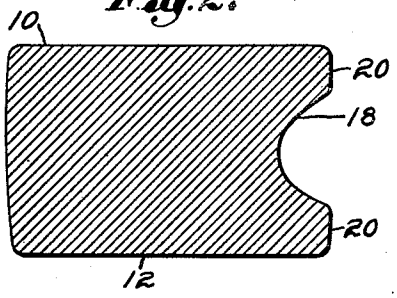


Fig. 3.

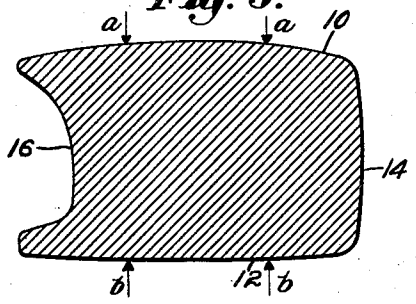


Fig. 4.

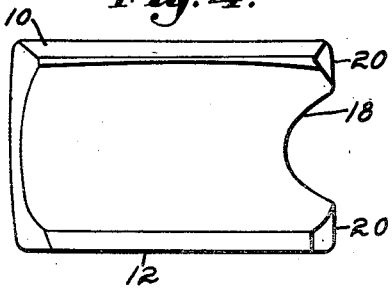
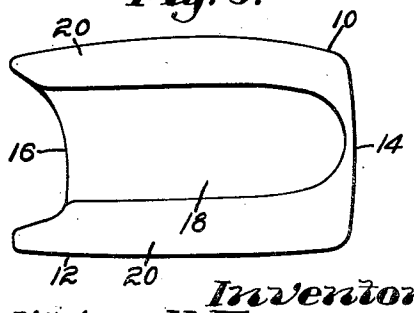


Fig. 5.



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Fig. 6.

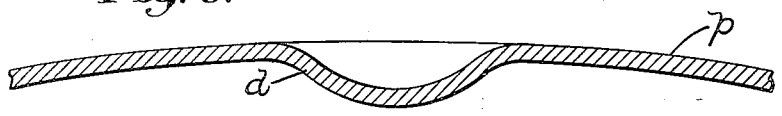


Fig. 7.

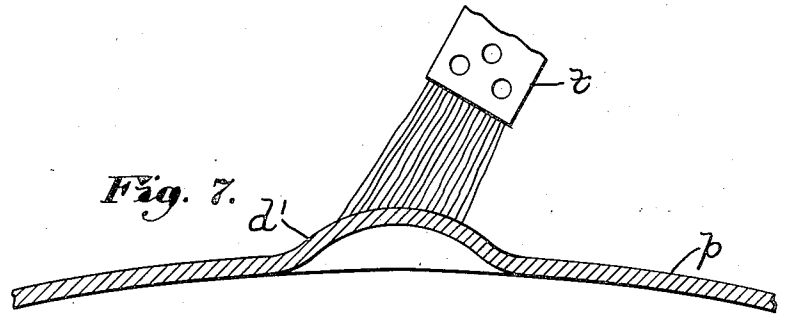


Fig. 8.

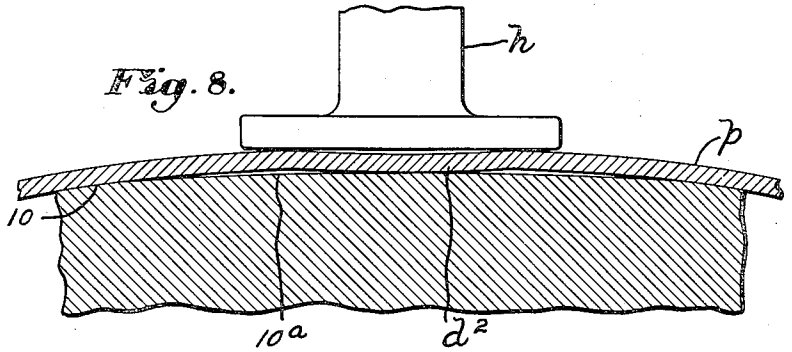
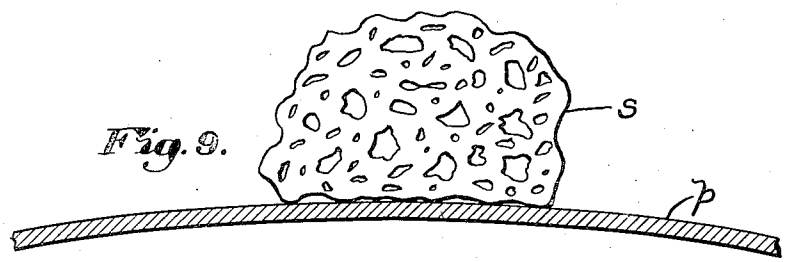


Fig. 9.



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SHRINKING DOLLY BLOCK

William H. Ferguson, Flint, Mich.

Application March 9, 1940, Serial No. 323,161

2 Claims. (Cl. 81—15)

The object of this invention is to provide a tool facilitating the restoration to form by a process of hot shrinkage of contoured sheet metal articles, such as automobile body parts, after they have been distorted.

My invention will be well understood by reference to the following description taken in connection with the accompanying drawings, wherein—

Fig. 1 is a perspective view of a dolly block exemplifying the invention;

Figs. 2 and 3 are sections on the lines 2—2 and 3—3 of Fig. 1 respectively;

Fig. 4 is an end elevation as seen from the lower left-hand side of Fig. 1;

Fig. 5 is an end elevation as seen from the lower right-hand side of Fig. 1; and

Figs. 6, 7, 8 and 9 are diagrammatic sections illustrating the method of use of the dolly block, the dimensions and proportions of the various parts being distorted and exaggerated for diagrammatic purposes.

I believe that my invention will be most readily understood if I first describe the physical construction of a dolly block illustrated in the accompanying drawings without attention to the reasons dictating such construction, and thereafter describe the method of its use whereby the purpose of its construction and the results achieved thereby will be plain.

Referring, therefore, to Figs. 1 to 5 of the drawings, I therefore illustrate a dolly block in the form of a metal forging which may be substantially square in plan and of a depth or altitude shorter than the sides of the square. The block is of a size to be conveniently held in the palm of the hand but of such weight or inertia as to enable it to withstand the shock of hammer blows and in so far it resembles the hand dollies commonly known and used in automobile body repair work. The face 10 of the dolly shown is throughout the greater portion of its area a high-crown surface, that is, it is of the contour or curvature corresponding generally to so-called high-crown surfaces found in automobile body constructions, those having a relatively short radius of curvature. The central portion of this face 10, as, for instance, the part between the arrows *a*—*a* in Fig. 3, constituting perhaps a third of the superficial area, is ground down relatively flat, that is, to a surface of longer radius of curvature merging into the surrounding high-crown surface. The margins of the face are relieved or curved off as usual in dolly blocks to obviate any corner which might cause marks.

The lower face 12 of the block is throughout the major portion of its area a low-crown surface, that is, is curved with a radius of curvature markedly longer than the surface 10 and corresponding to the so-called low-crown surfaces of automobile bodies, but the central portion, as between the arrows *b*—*b* in Fig. 3, is made still flatter relatively.

The end 14 (Fig. 3) extending between the faces 10 and 12 may be substantially similar to the face 12 except for its extent and may thus consist of a low-crown surface, the central portion of which is relatively flat.

Between the two faces 10 and 12 at the end of the block opposing the surface 14, a deep groove 16 is cut permitting the portions forming the faces 10 and 12 to overhang at that end. The purpose of this will hereinafter be explained.

On the right-hand side, viewing Figs. 2 and 4, there is provided a deep groove 18 flanged on either side by surfaces 20 which are formed to a high-crown contour. Otherwise described, this side of the block might be said to have a high-crown surface markedly relieved centrally beyond the chord of its arc.

The method of use of the device described may be understood from the following description taken in connection with the diagrams in Figs. 6 to 9. Before referring to these figures it may be well to recall that sheet metal as originally rolled in the flat form may be considered as having no substantial internal strains or stresses so that it will normally lie flat and tend to remain so. When, however, it is manufactured into an automobile body part, it is pressed by dies to the various contours which go to make up the outer surface of automobile bodies and fenders. Some of these parts embody various different contours in the same panel. When cold pressed or stamped in this manner, a condition of internal strain or stress is set up in the metal which may be most easily visualized if considered as a stretching or tension of those portions of the metal lying at the convex side of the contour, and this is the normal condition of the metal in the finished article.

Whenever any part of the automobile body or fender outer surfaces becomes jammed or is bumped or dented by the force of collision, the force of impact generally stretches the sheet metal outer structure or surfaces. The problem of the repair man is to restore these inwardly gouged and stretched sections to their original contour. This may be effected by utilizing a process of hot shrinkage in connection with the

tool which forms the subject matter of the present invention. Thus, referring to Fig. 6 of the drawings, I there show diagrammatically a curved metal panel *p* having a small, localized, inwardly extending dent *d*, which may be considered either as the original result of an accident or the result of repair operations on a damaged section which have otherwise eliminated the bulged or bent areas. This inward bulge is then everted to the outwardly extending bulge *d'* illustrated in Fig. 7. In other words, the preliminary treatment is a roughing out of the damaged sections until all inward indentation is forced outward into the form of an outward bulge whereby there is created a centripetal pressure within the bulged out section which holds the stretched section out beyond the normal contour surface.

To release this pressure and to restore the stretched metal to the normal contour the bulge *d'* is heated, as is diagrammatically illustrated in Fig. 7 by the showing of an acetylene torch *t*, on the highest portion of the stretched section throughout an area about an inch in diameter until the spot becomes a cherry red. The dolly block as described is placed at the under side of the panel *p* with its face **10** thereagainst so that the marginal portions fit the contour of the panel and support the same around the heated spot while the relieved portion **10***a*, illustrated in an exaggerated form in Fig. 8, underlies the spot, and then by medium hard blows of a suitable hammer *h* the metal is driven down onto the surface of the dolly block's face **10***a*, pressing the portion *d'* to the position d^2 beyond the normal contour of the surface *p*. After the hammer blows have been applied, the metal is cooled by the application of water with a sponge *s*. These operations are effected in rapid succession and can be applied as many times as are necessary until the metal surface is restored.

It is essential that the heated metal be driven down past the final contour which it is to assume, and when rendered more or less plastic by the heating and when contracted by the rapid cooling in the manner described, its internal stresses and strains due to its distortion by the accident are relieved and apparently it is released to the tensions of the surrounding undeformed portion of the panel and assumes a position continuous with the latter. The formation of the dolly with the flattened central portion makes this operation possible since the peripheral portion supports the surrounding metal and prevents it from becoming distorted and positions it so that it will act effectively on the heated portion to restore it to the original contour.

The high-crown face **10** permits such an operation as described on the high-crown sections of automobile bodies, such as the front and rear fenders, high-crown roof metal panels, high-crown contours of the trunk section, upper back panels, upper wheel house panels, and high-crown contours of hood panels. The low-crown face **12** may be used for low-crown contours such as lower door panels, lower wheel house panels, sides of hood panels, center of metal roof panels, low-crown sections of upper hood panels and low-crown skirts of fender sections. The narrow face **14** fits concave surfaces, such as the concave surface of front fenders between the radiator shell and the outer part of the fender, the concave lower wheel house panels, the concave rear end of front fenders, the concave lower door panel sections, rear end of rear fender adjoining the wheel house panel, and inset headlamp panels.

The groove **16** between the faces **10** and **12** opposite the end **14** permits the block to be positioned where a return flange or other obstruction is closely adjacent the stretched section as may occur if the latter is close to a panel's edge. Thus, the groove will straddle such a flange and permit, for instance, the overhanging portions of either face **10** or **12** to extend to a position opposite the same where the entire body of the block could not be inserted.

The groove **18** is provided to permit the setting down of a welded seam so that the damaged panel can be finished off without sacrifice of any of the strength of the weld. When a panel or fender has been torn and welded together, it is impossible to finish off the welded surface smooth without filing away so much of the weld as to sacrifice much of the strength thereof. If, however, the dolly here shown is placed beneath the weld with the groove **18** opposite the same and the parts **20** supporting the contour of the panel on either side thereof, the welded seam may be forced down into the groove by medium blows of a cross-peen or straight-peen hammer while the two edge portions **20** paralelling the groove hold the natural contour surfaces in position. No part of the metal at the weld need be cut away and the full strength thereof is therefore maintained. The groove thus formed can be filled in with solder to be finished off to the desired contour, effectively concealing the damage and repair.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. A tool of the class described comprising a portable body of substantial mass and weight to offset the shock of hammer blows having a contoured surface to fit the concave side of a curvilinearly contoured sheet metal panel and support it over a substantial area around the margins of said surface, said surface being centrally relatively flattened to permit the localized displacement of a portion of such area beyond the contour for subsequent release to the tensions of adjoining parts which have been supported in said contour by the tool.

2. A tool for facilitating the re-positioning in the contour of bulged out spots in a curvilinearly contoured sheet metal structure comprising a supporting member having substantial inertia and having an extended face, the major portion of which corresponds as a unit to said contour but of which a central portion is relatively depressed, a side of the member being cut away to permit a portion of the surface to overhang from the main body of the member whereby to permit said face to be applied to the inner surface of a contour which lies closely adjacent a return flange or similar obstruction.

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