Sept. 27, 1960 F. REED 2,953,847

METHOD FOR FILLING A HOLE IN METAL SHEETING

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FIG. 1.

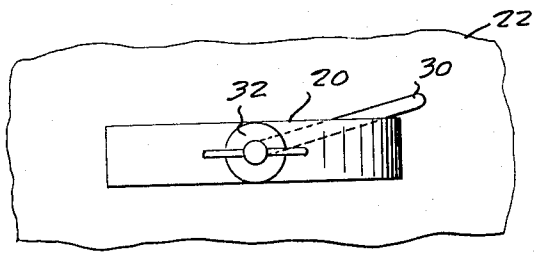
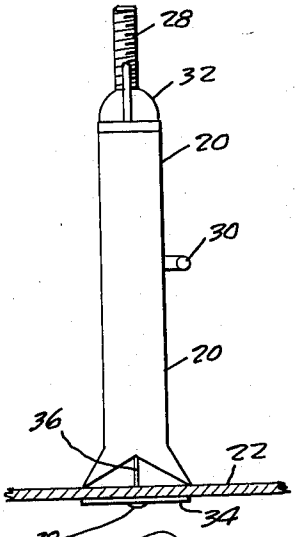


FIG. 3.



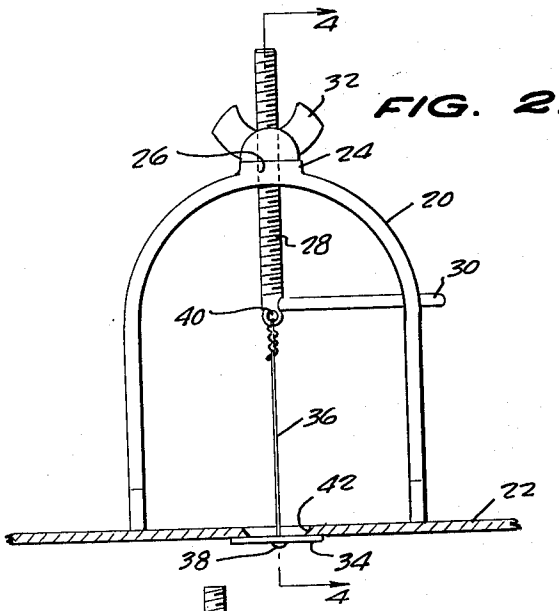


FIG. 2.

FIG. 4.

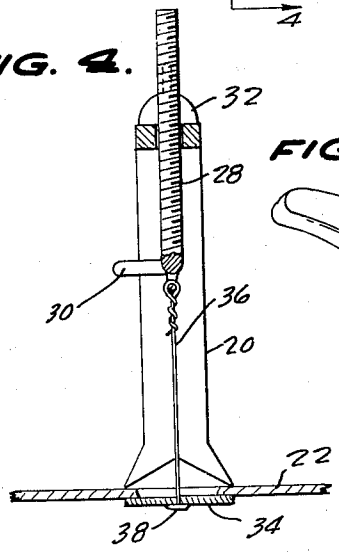
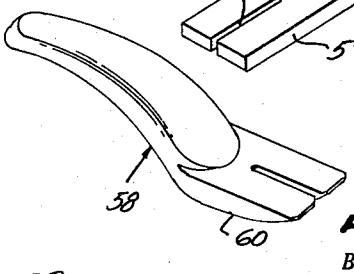


FIG. 6.



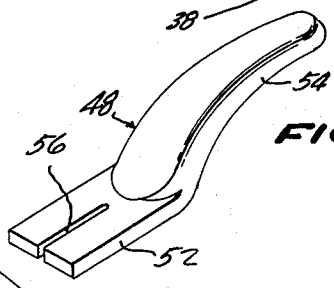


FIG. 5.

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FIG. 7.

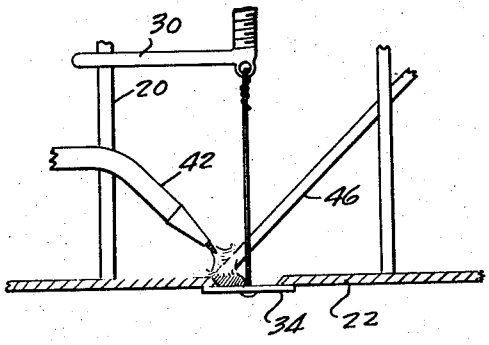


FIG. 8.

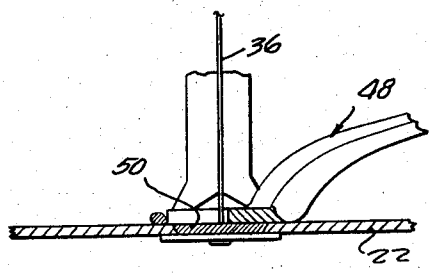


FIG. 9.

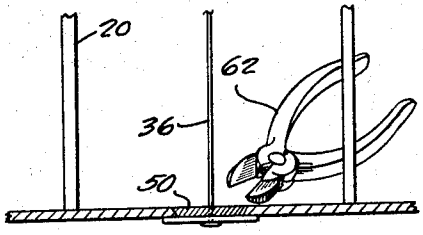


FIG. 10.

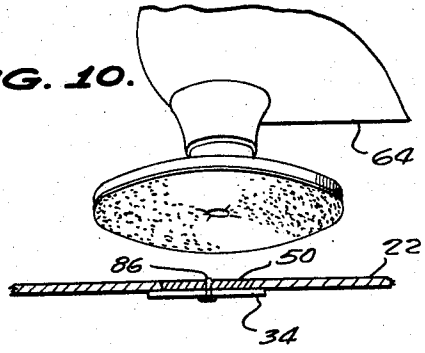


FIG. 11.

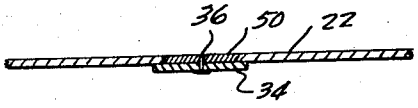


FIG. 14.

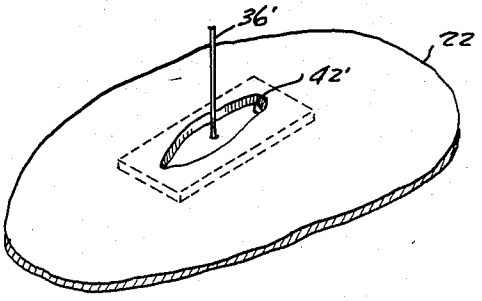


FIG. 12.

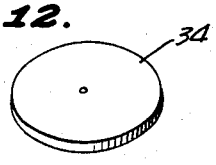
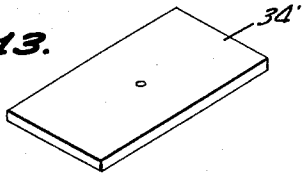


FIG. 13.



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METHOD FOR FILLING A HOLE IN METAL SHEETING

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Filed Feb. 21, 1958, Ser. No. 716,618

3 Claims. (Cl. 29—401)

The present invention relates to a method for filling a hole in metal sheeting.

An object of the present invention is to provide a method for filling a hole in metal sheeting which enables an operator to fill a hole in a metal panel, such as an automobile body or fender, with facility and dispatch.

Another object of the present invention is to provide a method for filling a hole in metal sheeting which enables an operator to fill a hole in a metal panel in which no access is provided to the underface of the panel.

A further object of the present invention is to provide a method for filling a hole in metal sheeting which is economically feasible and highly efficient in action.

These and other objects and advantages of the present invention will be fully apparent from the following description when taken in conjunction with the annexed drawings, in which:

Figure 1 is a plan view of a supporting device for use with the method of the present invention;

Figure 2 is an elevational view of the device shown in Figure 1, showing the device installed over a hole in a metal panel and supporting a bracing element on the other face of the panel;

Figure 3 is a side elevational view;

Figure 4 is a sectional view taken on the line 4—4 of Figure 2;

Figure 5 is an isometric view of a spreading and smoothing tool used in the method of the present invention;

Figure 6 is another isometric view of a second spreading and smoothing tool;

Figure 7 is a fragmentary elevational view showing a step in carrying out the method of the present invention;

Figure 8 is a fragmentary elevational view showing another step in the method of the present invention;

Figure 9 is a fragmentary elevational view showing a further step;

Figure 10 is an isometric view showing the final step in carrying out the method of the present invention;

Figure 11 is a sectional view through the metal panel in its finished form;

Figure 12 is an isometric view of one form of a bridging element used in the method of the present invention;

Figure 13 is an isometric view of another form of a bridging element; and

Figure 14 is an isometric view showing the use of the bridging element shown in Figure 13 in filling a hole in an installed metal sheeting or panel.

Referring in greater detail to the drawings in which like numerals indicate like parts throughout the several views, Figures 1 to 4, the reference numeral **20** represents an inverted U-shaped bridging device having the free ends of each of its legs bifurcated, as in Figure 3, and sharpened to a pair of points so as to provide a nonslip engagement with a metal panel **22**. The bight of the device **20** has a vertically extending threaded bore **26** threadedly

receiving a vertically disposed screw element **28**. A horizontally disposed arm **30** projects outwardly from the lower end of the screw element **28** and abuttingly engages one of the legs of the device **20**, thereby preventing rotation of the screw element **28** more than approximately 180 degrees. A thumb nut **32** is threadedly engaged upon the portion of the screw element **28** above the boss **24** and serves, when rotated, to raise or lower the screw element **28**.

The method of the present invention provides a bridging element **34** having a flexible supporting member **36** projecting perpendicularly from the midportion of the bridging element **34**, as shown in Figures 2, 3, and 4. The supporting member **36** is preferably a strand of wire having a button or an enlargement **38** on the lower end thereof and having the upper end inserted into a transverse bore **40** provided in the lower end of the screw element **28** with a portion adjacent the upper end wrapped around itself to secure the member **36** to the lower end portion of the screw element **28**.

The next step consists in positioning the bridging element **34** so that the member **36** extends through the hole, as at **42** in Figure 2 and in Figure 4, in the panel **22** with the free end of the member **36** perpendicular with respect to and spaced from one face of the panel **22** and so that the bridging element **34** extends across the hole **42** with a portion of the bridging element **34** mounting the hole **42** in bearing contact with the opposite face of the panel **22**.

With the bridging element **34** on the underface of the panel **24** and covering the hole **42**, tension is applied to the supporting member **36** by tightening of the thumb nut **32** with the arm **30** at the limit of its clockwise movement, as seen in Figure 1 and abutting against the one leg of the device **20**. This applies a pulling force to the free end of the supporting member **36** of a magnitude such as to maintain the bridging element **34** in position against the other face of the panel **22**.

The next step consists in applying heat, as shown in Figure 7, in which the nozzle of a gas or acetylene torch is shown and designated by the reference numeral **44**, to one end of a stick of solidified pure metal or alloy, as at **46**. With the metal melting and in a molten or fusing state, the hole **42** is filled to excess, as shown in Figure 8, and a smoothing tool is used to smooth the upper surface of the plug thus formed in the hole **42**. Previously, a flux has been added to the beveled or countersunk walls of the hole **42** and to the exposed part of the bridging element **34** so that the bonding metal or alloy flows easily over the exposed portion of the element **34** and upwardly along and in close metallic contact with the walls of the opening **42**. The tool **48** shown in Figure 8 smoothing the plug **50** formed by the molten metal is shown in detail in Figure 5 and is seen to have a flat bifurcated lower portion **52** and an upwardly extending curved handle **54**. The slot **56** in the portion **52** of the tool **48** is used to receive the supporting member **36** so that the tool **48** may be worked around the supporting member **36** as the cooling plug **50** is smoothed so that its upper surface is substantially coplanar with the upper surface of the panel **22**.

Another form of the smoothing tool is shown in Figure 6 and designated by the reference numeral **58**, such tool having a rounded lower smoothing surface as at **60**.

After the molten material has been spread over the entire area of the hole **42**, it is allowed to solidify to a solid plug integrally bound to the walls of the hole and to the bridging element **34**.

The next step consists in, as shown in Figure 9, severing the supporting member **36** adjacent the plug thus formed, such severing being done with a hand actuable wire cutter as at **62**.

The next and final step of the method of the present invention consists in abrading away, by a portable grinder **64**, for example, as shown in Figure 10, the portion of the plug **50** and the severed portion of the supporting member **36** exteriorly of the plug **50** until the plug **50** and the exposed part of the remaining piece of the member **36** is flush, as shown in Figure 11, with the upper face of the panel **22**.

When the underface of the panel to be patched with such a formed plug is accessible, the bridging element may be round, as in Figure 12, and positioned as heretofore described. When the underface of the panel has no access opening thereto, a bridging element such as is shown in Figure 13 may be used as shown in Figure 14 to bridge the underface of an opening in such panel having no access thereunder. In this case, the bridging element, designated by the reference numeral **34'** in Figure 13 and in Figure 14, is first inserted through the hole in the panel from one face to the other face of the panel with the free end of the associated supporting member **36'** spaced exteriorly of such hole, the latter being designated by the reference numeral **42'**. With the element **34'** positioned so that it extends across the hole **42'** with the portion bounding the hole in bearing contact with the panel underface and the free end of the supporting member **36'** perpendicular with respect to and spaced from the panel upper face, the previously described steps of filling the hole with a metallic material and smoothing the same, severing the supporting member and abrading the thus formed plug and remaining portion of the supporting member are performed to carry out the method of the present invention for filling a hole in an installed metal panel or sheeting with a plug formed wholly from a fused material.

It will be seen therefore that in carrying out the method of the present invention the sheeting or panel having the hole to be filled with a plug formed wholly from a fused material, certain precautions must be taken in the preparation of the hole and bridging element **34, 34'**. The walls of the hole must be clean and wiped with flux and the adjacent exposed portion of the element **34** must be similarly clean and wiped. Tension applied to the supporting member **36** must be such that there is no undue bending of the panel **22** and when heat is applied by the nozzle **44** to the metal stick or solder bar **46**, the heat must be such that no warping of the bounding wall of the hole nor of the element **34** occurs. Preferably, the tool **48** is used first to smooth and spread the molten metal or alloy of metals with the area of the hole and the tool **48** is then used to obtain as flat a surface as possible on the cooling plug **50**. With the walls of the hole previously tapered with a file so as to have a countersunk appearance and subsequent bounding of the plug **50** to the walls of the hole, the adherence of the plug **50** to the exposed portion of the element **34** will effectively hold the plug **50** within the hole in the panel **22**.

What is claimed is:

1. The method for filling a hole in installed metal sheeting with a plug formed wholly from a fused material which comprises providing a bridging element having a supporting member projecting perpendicularly from the midportion thereof, positioning said element so that said member extends through said hole with the free end of said member perpendicular with respect to and spaced from one face of said sheeting and said element extends across said hole with the portion bounding said hole in bearing contact with the other face of said sheeting, applying a pulling force to the free end of said member of a magnitude such as to maintain said bridging element in position against the sheeting other face, filling said hole with a metallic material in a fused state while the pulling force is being applied to the free end of said member, maintaining the pulling force while allowing the material filling said hole to solidify to a solid plug integrally bound to the wall of said hole and to said element, severing substantially all of the free end portion of said supporting member at a location adjacent of the solidified plug and removing said severed portion of the supporting member, and abrading away the portion of the thus formed plug and the severed portion of said member exteriorly of the thus formed plug until it is flush with said one face of said sheeting.

2. The method for filling a hole in installed metal sheeting with a plug formed wholly from a fused material which comprises providing a bridging element having a supporting member projecting perpendicularly from the midportion thereof, inserting said element through said hole from one face to the other face of said sheeting with the free end of said member spaced exteriorly of said hole, positioning the thus inserted element so that it extends across said hole with the portion bounding said hole in bearing contact with the sheeting other face and the free end of the member perpendicularly with respect to and spaced from the sheeting one face, applying a pulling force to the free end of said member of a magnitude such as to maintain said bridging element in position against the sheeting other face, filling said hole with a metallic material in a fused state while the pulling force is being applied to the free end of said member, maintaining the pulling force while allowing the material filling said hole to solidify to a solid plug integrally bound to the wall of said hole and to said element, severing substantially all of the free end portion of said supporting member at a location adjacent of the solidified plug and removing said severed portion of the supporting member, and abrading away the portion of the thus formed plug and the severed portion of said member exteriorly of the thus formed plug until it is flush with said one face of said sheeting.

3. The method for filling a hole in installed metal sheeting with a plug formed wholly from a fused material which comprises providing a bridging element having a supporting member projecting perpendicularly from the midportion thereof, inserting said element through said hole from one face to the other face of said sheeting with the free end of said member spaced exteriorly of said hole, positioning the thus inserted element so that it extends across said hole with the portion bounding said hole in bearing contact with the sheeting other face and the free end of said member perpendicularly with respect to and spaced from the sheeting one face, applying a pulling force to the free end of said member of a magnitude such as to maintain said bridging element in position against the sheeting other face, filling said hole with a metallic material in a fused state while the pulling force is being applied to the free end of said member, spreading said material while in a fused state over the entire area of said hole, maintaining the pulling force while allowing the material filling said hole to solidify to a solid plug integrally bound to the wall of said hole and to said element, severing substantially all of the free end portion of said supporting member at a location adjacent of the solidified plug and removing said severed portion of the supporting member, and abrading away the portion of the thus formed plug and the severed portion of said member exteriorly of the thus formed plug until it is flush with said one face of said sheeting.

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