May 3, 1966 J. D. SMITH 3,249,252

DEVICE FOR REMOVABLY COVERING AN OPENING IN A STRUCTURAL MEMBER

Filed Dec. 20, 1963

FIG. 1

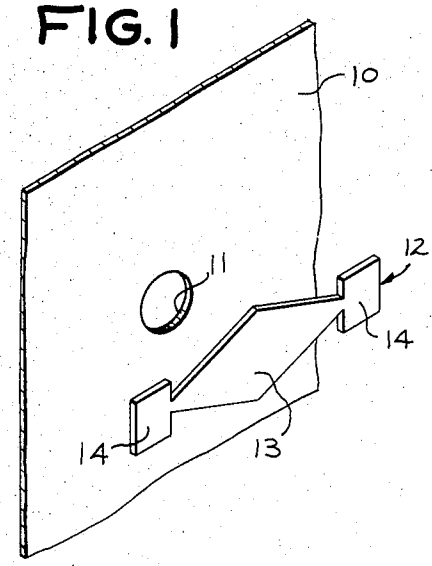


FIG. 2

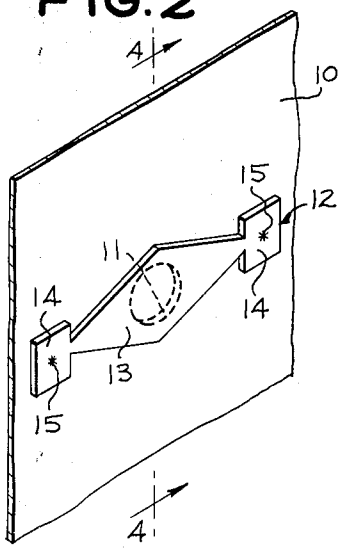


FIG. 3

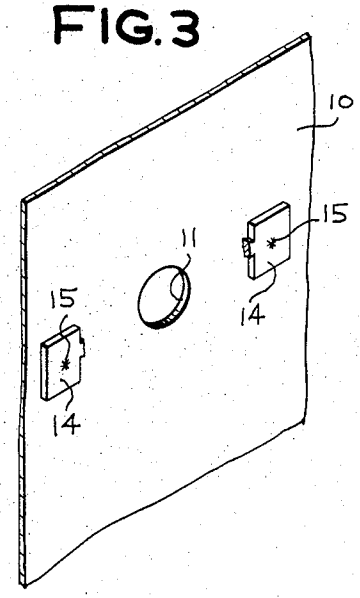
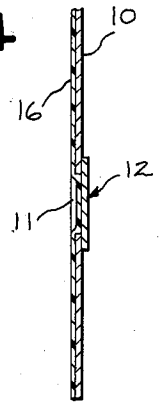


FIG. 4



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DEVICE FOR REMOVABLY COVERING AN OPENING IN A STRUCTURAL MEMBER

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1 Claim. (Cl. 220—27)

This invention relates generally to the fabrication of materials and, more particularly, to an arrangement for removably covering an opening in a structural member.

With present day mass production techniques it is quite often desirable to design a specific structural member so that it may be employed in a variety of end products. For example, in the dishwasher industry each manufacturer generally produces several models of dishwashers. Although the basic structural members such as, for example, the members comprising the appearance cabinet, are essentially identical for all models, the number or location of fluid conduits or electrical conductors passing through a structural member varies among the different models. The savings in time, money and machinery realized by having all such structural members interchangeable, despite the differences mentioned, are substantial. Therefore, it has been proposed that all such structural members be manufactured with all the openings therein necessary to accommodate any conceivable combination of fluid conduits and electrical conductors which may pass through the structural member.

Various means for achieving this interchangeability have been proposed in the past. These include the concept of scoring or cutting the structural member so that a hole is almost formed therein but a small segment of material integrally interconnects the structural member with the plug-like cut portion. The theory being with this arrangement that it is then quite easy to simply knock out the plug if an opening is needed at that point. This method has disadvantages including difficulty in reproducing a score or cut which will consistently require the same force to remove the plug. In dishwasher applications, the thickness of the material comprising the structural member (about .036 inch) is such that if the score is made by a punch, the force required to provide a plug which is easily removable quite often results in cracks adjacent the score. This presents problems, of course, since the dishwasher structural member usually is coated with a water-proof plastic which may be damaged, due to the cracks, when the plug is removed. More importantly, however, in most dishwasher applications, it is necessary to provide a smooth, clean round hole for the conduit or conductor to pass through. The method just described generally does not provide a smooth, round hole.

Accordingly, it is an object of this invention to provide an improved arrangement for removably covering an opening in a structural member.

It is also an object of this invention to provide a removable cover means for an opening in a structural member which does not affect the smoothness or roundness of the opening.

Briefly stated, in accordance with one aspect of the present invention, means are provided to removably cover, or plug, an opening in a structural member including a device having a first portion adapted to overlie the opening. The device has a second portion adapted to be secured to the structural member by such means as, for example, welding. Between the first portion and the second portion, the device has a place of reduced structural strength which may result from reduced cross sectional area so that the first portion may be broken from the second portion with relative ease.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view showing a structural member with an opening therein and the device of the present invention in spaced relationship thereto;

FIGURE 2 is a view similar to FIGURE 1 showing the device of the present invention secured to the structural member;

FIGURE 3 is a view similar to FIGURE 2 with the central portion of the device broken away; and

FIGURE 4 is a view taken along line 4—4 of FIGURE 2.

Referring now to the drawings, and particularly to FIGURE 1, there is illustrated a structural member **10** having an opening or hole **11** therein. Structural member **10** may be fabricated from metal, plastic, wood or other substantially rigid material since the exact material employed is not critical to the present invention.

In accordance with the present invention, a device **12** is provided to cover, or plug, the opening **11**. Device **12** comprises a central portion **13** which is of sufficient size to completely cover opening **11**. Attached to either end of central portion **13** are end portions **14**. At the place where end portions **14** connect to central portion **13**, the cross-section area of device **12** is considerably reduced, thereby creating a place, or locality, of reduced structural strength.

In FIGURE 2, device **12** is illustrated as attached to member **10** such that central portion **13** completely covers opening **11**. End portions **14** are secured to structural member **10** by weld spots **15**. Weld spots **15** are presented only for purposes of illustration since, quite obviously, portions **14** could be secured to member **10** by such means as a bolt and nut combination, or they could be simply glued to member **10** to provide a rigid connection with member **10**.

As mentioned above, places of reduced structural strength exist where central portion **13** joins each of the end portions **14**. Accordingly, when a force is applied to central portion **13**, either through opening **11**, or by means of wedging a tool between the surface of member **10** and the adjacent surface of portion **13**, portion **13** separates from end of portions **14** leaving the arrangement as illustrated in FIGURE 3.

FIGURE 4 illustrates the surface finish which may be obtained with the present invention when the device **12** is not removed or broken from member **10**. In FIGURE 4, structural member **10** may represent the tub wall of an automatic dishwasher which is often lined with a plastisol coating **16**. Portions **12** and **14** are substantially coplanar and, when device **12** is secured to member **10**, all of said portions are disposed entirely on one side thereof, as illustrated in FIGURES 2 and 4, to facilitate the application of the coating **16**.

Thus, it can be seen that the present invention provides means to removably cover an opening in a structural member wherein the cover in no way affects the smoothness or roundness of the opening. This is to be distinguished from an arrangement wherein a knockout plug is achieved by scoring the member and then leaving the cut portion in place to be removed at a later time to form a hole. With the present invention, a clean, smooth opening of any size or shape may be formed in a structural member since, during the hole forming operation, care does not have to be taken to assure that an easily removable plug remains in the member **10**.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various other modifications or

applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

In combination:

(a) a structural member having a hole therethrough,

(b) a rigid cover member having a central portion sufficiently large to completely cover said hole,

(c) said cover member further having an end portion at each end of said central portion welded to said structural member,

(d) said cover member further having a place of minimum cross sectional area at the junction between each of said end portions and said central portion,

(e) said central portion and said end portions being coplanar and disposed entirely on one side of said structural member,

(f) whereby a force applied to said central portion will break said central portion from said end portions at said places of minimum cross sectional area.

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