

July 18, 1961

J. S. GODLEY
CORROSION INHIBITING COMPONENT FOR METAL
CONSTRUCTION AND METHOD OF USING SAME

2,993,110

Filed Feb. 17, 1958

2 Sheets-Sheet 1

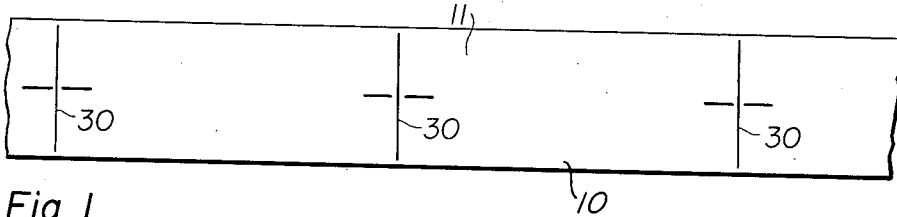


Fig. 1

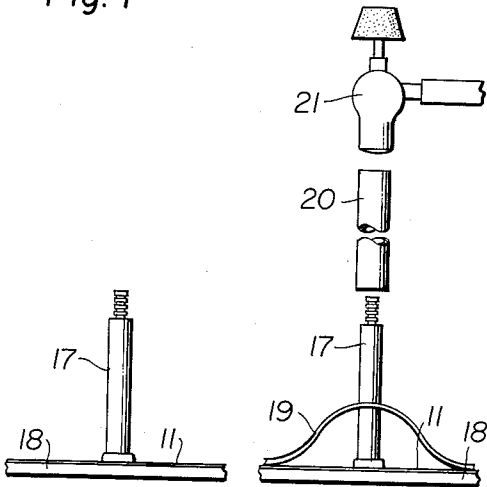


Fig. 2

Fig. 3

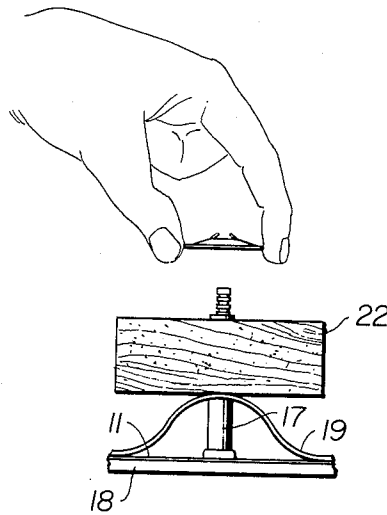


Fig. 4

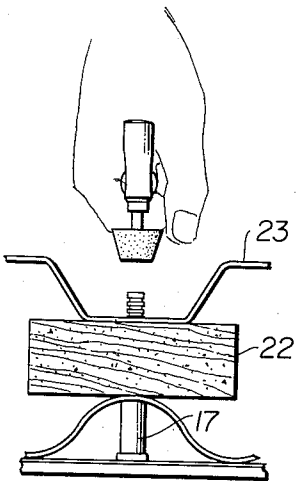


Fig. 5

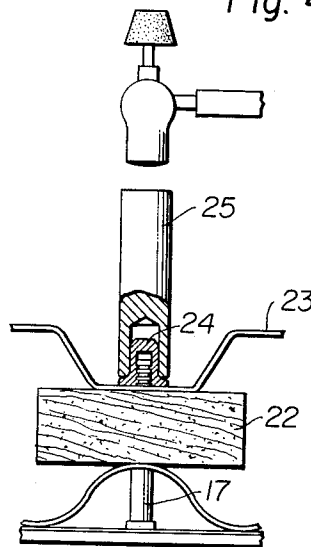


Fig. 6

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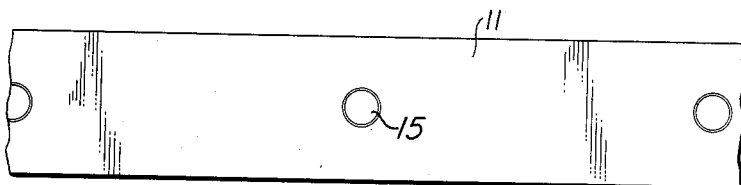


Fig. 7

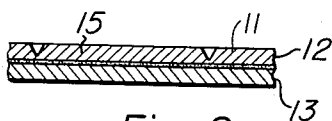


Fig. 8

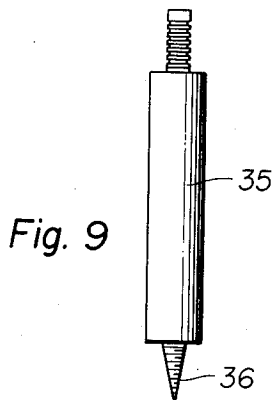


Fig. 9

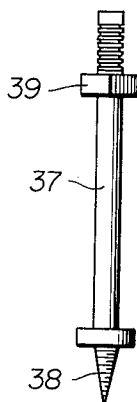


Fig. 10

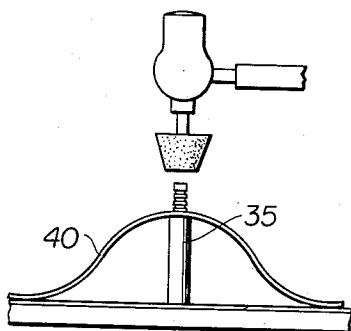


Fig. 11

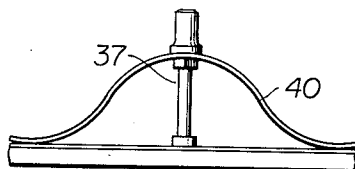


Fig. 12

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CORROSION INHIBITING COMPONENT FOR METAL CONSTRUCTION AND METHOD OF USING SAME

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1 Claim. (Cl. 219—99)

This invention relates in general to industrial building construction, and relates more specifically to a novel means and method of simultaneously providing a treble benefit of eliminating the galvanic corrosion occasioned by the difference in electrochemical potential between a supporting frame of one metal and a wall sheet of another metal; providing accurate means of locating fasteners for holding the wall; and providing an aid to the production of clean weld metal for end welded studs secured to the supporting frame.

Curtain wall construction has become a major building technique. Many curtain materials have been developed, including fully fabricated glass panels. A simple closure wall may consist of a single sheet of flat, corrugated, or ribbed form.

One important closure panel for both wall and roof has been termed a sandwich wall. Whenever such sandwich wall is field assembled, it consists of an inside skin of flat, corrugated, or ribbed form, usually .032 inch or .050 inch thick, impaled over projecting fastening studs to serve as the inner wall facing.

In the field construction of a sandwich curtain wall, after this inside skin is installed, it is supplemented by insulation material, also impaled over the studs, and an outside skin which usually has either a ribbed or corrugated shape. All of these components are held in place by a cap member secured to the end of the stud.

Although any type of secured stud will be useful for curtain wall construction, and although the novel surface coating conceived in this invention will apply to screw type stud construction, generally, this invention will find its greatest application in the field of end welded studs. Field language refers to such technique as "stud welding." This terminology applies to the technique of placing a stud against a surface to which it is to be welded, with a welding current flowing through the stud and the surface, and thereafter drawing the stud away from the surface to draw a weld arc. The arc creates a welding pool of molten metal in a short period of time, whereupon the stud is plunged into such pool and the pool is allowed to cool and weld the stud to the surface. Such welding is done in the presence of a flux to assure a clean weld joint. The most common flux is aluminum.

The electropotential of various metals in the presence of an electrolyte is the factor most to be considered. It will then be realized that the usual steel framework of a building and the commonly employed aluminum sheet wall will have the ability to corrode when in contact because of the presence of condensed atmospheric moisture bearing dissolved salts and gases to serve as an electrolyte.

Because of the galvanic action that takes place between the dissimilar materials, such as steel in the structural building frames and the aluminum sheet, it has heretofore been required that the supporting contact surfaces be painted with a coat of an aluminum bitumastic paint. This paint serves as an insulating agent to protect these two dissimilar metals from galvanic action.

From the beginning, the promotion of aluminum wall panels has met with some resistance from owners and contractors due to the high painting costs to paint the surface after the studs were welded to the frame. It was necessary to paint after the studs were in place because of the inability to end-weld studs through the aluminum

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bitumastic paint. These large costs to paint after the studs were welded, brought about a search for a better and less costly means to prevent galvanistic corrosion. It was then discovered that a foil tape could serve a multiple purpose, three basic purposes being:

(1) As an insulating agent between the dissimilar metals.

(2) As a template for accurate location of fasteners on spaced centers, conforming with the corrugation of standard corrugated aluminum sheets and the ribs of standard ribbed aluminum sheets.

(3) As a flux.

Having this basic concept in mind, a cost survey was conducted to determine the cost of painting the supporting surfaces in various parts of the United States. The painting costs at Chicago in 1957 ranged from ten to fifteen cents a linear foot. A contractor in New York City indicated that firm bids for painting without studs in place ran from twelve to sixteen cents per linear foot, and the cost would be greater with studs in place. A Lorain, Ohio, contractor on contract for an engineering building for Nelson Stud Welding Division of Gregory Industries, Inc., bid the painting of the surface at eighteen cents a linear foot. This invention will provide better service at about 60 to 70 percent of painter's costs. With this information at hand, it is obvious that this tape invention will save contractors and owners thousands of dollars in labor and paint costs. Also, welded studs were heretofore located by means of metal templates. The elimination of the handling of bulky metal templates for the location of studs to the surfaces has a real and genuine effect on cost for the roofing and siding contractors.

Gregory Industries is considering the possibilities of now marketing a low-cost fastener stud for single skin corrugated aluminum. It is intended that the fastening device will not have a flux-filled end. It has become established in the laboratory and in the field that a foil tape can be used with indicia marks on spaced centers to provide for simple, easy location. By welding through the foil tape, if of a flux-type metal, the tape provides a fluxing action to the weld which is highly beneficial and improves the quality and consistency of the welds.

This tape invention promises to provide great benefits in that it will protect the construction from the galvanic action caused by associating dissimilar metals. A further advantage to the owner is that it will greatly reduce the cost of the building by saving as much as 40 percent of painting of the surface. It has obvious advantages to the contractor in that it provides a simple way to handle templating for location of the studs. For the contractor erecting uninsulated walls, a much lower cost stud without a flux load can be provided. By welding through the tape the aluminum will give highly satisfactory and consistent welds, thus speeding the work and reducing labor costs.

Therefore, the outlined objects of the invention may be summarized as follows:

(1) To reduce the cost of providing a galvanic barrier between a steel supporting structure and a closure wall of dissimilar metal.

(2) To provide such protection by a dimensionally stable tape, which tape carries indicia to act as a fastener locator template.

(3) To provide a weld flux in the form of a foil of tape adhered to the supporting surface over the spot to which a stud is to be welded by stud welding principles.

(4) To combine all of these advantages into one easily applied tape roll capable of being applied by unskilled labor in any temperature and under any weather conditions.

Other objects and a fuller understanding of the invention may be had by referring to the following description and

claim, taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a top surface view of an aluminum foil tape having a series of template marks printed on the surface of the tape;

FIGURE 2 illustrates a stud welded through the tape and secured to a supporting surface;

FIGURE 3 illustrates the impaling of a sheet over the welded stud by means of an impaling tool;

FIGURE 4 illustrates the impaling of an insulating material over the stud and the installation of a speed clip to hold the insulation temporarily in place;

FIGURE 5 illustrates the use of the rubber end of the hammer to impale an exterior sheet over the stud to draw the extension through the sheet;

FIGURE 6 shows the preferred method of securing a camp member on the end of the stud to lock the construction permanently in operative position;

FIGURE 7 is a surface view of the foil tape having a series of template marks partially stamped out of the tape;

FIGURE 8 is a section view taken substantially along the line 8—8 of FIGURE 7;

FIGURE 9 is a side elevational view of one type of screw thread secured stud;

FIGURE 10 is a alternate type of screw thread secured stud;

FIGURE 11 illustrates the field installation technique of impaling a single sheet over a stud by means of a rubber headed hammer; and,

FIGURE 12 is a side view of the holding stud with a single sheet held permanently in place by means of the preferred holding cap clenched thereon.

Although the introductory explanation will serve to set forth the basic principles of the invention with considerably clarity, nevertheless, the following specific illustration, with reference to the drawing, will better explain the details of the invention.

FIGURE 1 illustrates the composite tape referred to by the reference character 10. FIGURE 7 illustrates the same tape with removable areas 15 partially blanked out for easy removal. These areas 15 may be fully removed if desired. For the construction of the tape for handling, refer to the FIGURE 7. This composite tape consists of a metal foil strip 11 with a mastic adhesive 12 and a protective paper backing 13. In order to apply the tape to a surface and to seal out electrolyte from between the surfaces, the mastic adhesive 12 is applied to the back surface of the metal foil strip 11. This mastic adhesive 12 is selected to provide long life adhesion. There are no appreciable physical stresses applied to the adhesive, because the protective metal foil merely rests in position, but the tape must remain in place with good adhesion until the insulation of the sheets is complete and must remain in adherence permanently thereafter.

Furthermore, this mastic adhesive is employed to seal out any electrolyte from entering between the tape and the supporting surface. It has been established that metals far apart in the electrochemical series may be placed in contact provided the contact is free of any electrolyte. The very presence of the mastic adhesive reduces the actual physical contact and further aids the prevention of corrosion.

The FIGURE 8, being a sectional view of the composite tape 10, has been taken to illustrate the relationship of the three components in section. The relative thickness of the separate members is arbitrary and exaggerated in the FIGURE 8 and may be varied at the will of the manufacturer according to the needs involved.

Whenever a quality construction is desired, the holding members must be located on the supporting surface at accurately spaced intervals and the sheet material applied thereafter. Screw attached or welded studs may be employed, although the welded studs have many advantages. If screw fasteners are selected, this tape will provide the combined advantage of corrosion protector and accurate

location marking to eliminate the use of cumbersome templates. If welded studs are selected, the tape can also aid as a flux if flux material is used for the tape.

In the series of figures from FIGURE 2 through FIGURE 6, the progressive steps employed for the construction of a modern sandwich wall with insulation is illustrated. An understanding of this construction and the process by which it is carried out, will show the three principal advantages combined into one unit by the preferred tape construction of this invention.

In FIGURE 2, a stud 17 is shown welded to a supporting surface 18. Those familiar with building construction will recognize the supporting surface as a gert or purlin, but any supporting surface which will be weldable to the stud 17 may be provided with the wall illustrated by this construction.

In FIGURE 3, a corrugated sheet 19 has been shown impaled upon the stud 17 and pushed down over the stud into contact with the surface 18 by means of an impaling tool 20 and hammer 21.

The next step in the procedure is to impale a thickness of insulation material 22 over the exposed portion of the stud 17. This procedure is illustrated in FIGURE 4.

Next, an outside sheet, illustrated as a ribbed sheet 23, is impaled by the rubber head of the hammer 21 over the tip end of the stud 17.

Finally, the compression lock cap 24 is clenched upon the ribbed end of the stud 17 by means of a compression tool 25 driven once again by the hammer 21.

This construction appears to be quite simple and in fact it is. It is a very highly successful field assembly procedure for closing the walls of a frame constructed for a building. One serious problem is to prevent corrosion between the sheet 19 and the support 18 whenever different materials are employed which are capable of corroding because of being spaced in the electrochemical series. Most commonly, the sheet 19 will consist of aluminum alloy and the support 18 will be steel. These materials are quite corrosive with respect to one another when in contact in the presence of moisture which is capable of acting as an electrolyte. Condensed moisture within the wall is virtually impossible to eliminate, and consequently, corrosion is a serious factor.

As previously indicated, painting the surface of the support 18 is a slow and costly, as well as relatively unsatisfactory, method. Therefore, by stripping the paper backing 13 from the tape 10 and applying the foil 11 to the surface 18 with the tightly adhering and sealing adhesive 12, a surface coating of foil is provided over the support 18 which is electrochemically inactive with respect to the sheet 19, and is sealed against the entry of electrolyte on the surface which contacts the dissimilar material, and hence the effect insulates the sheet 19 from the support 18 insofar as corrosive action is concerned. Electrical insulation of the tape from the support surface is desired, but is not always accomplished. However, by the use of the sealing adhesive 12, all atmospheric electrolyte is sealed out; and therefore, no corrosion takes place even when contact of the tape with the supporting surface is made. In the FIGURES 2 through 6, the reference character 11 is employed alone, because of the difficulty of illustrating the adhesive material 12 in such small detail.

The presence of the foil tape, particularly when it is aluminum, is not a deterrent to the welding of the stud 17 to the support 18, and in fact is an aid. Aluminum serves as a flux agent to help provide a sound stud weld. Additional flux material may be employed if desired. On larger size studs, additional flux material usually is involved. As thus far described, the tape is shown to have two outstanding virtues of providing a stop to corrosive tendencies and providing a fluxing action for weld type studs when welded through the tape.

A third and very important function is provided by the tape. It has been found that the location of the studs 17

is a very critical problem in the construction of large buildings. The peak areas of commercially available sheets are supposed to be uniformly spaced in sequence. Normally the spacing sequence is 8 inches; but for some specific applications, sequences other than 8 inches are used. However, when attempts have been made to hold such a sheet in position against the supporting surfaces with the studs welded at a point of contact of the corrugation with the supporting surface, the studs are not always located on exact spaced centers. In fact, more often than not the spacing will begin to vary the location of the studs and eventually result in a considerable accumulative error. If only a single skin wall were to be constructed, such error would be entirely acceptable with no difficulties. However, in the construction of a sandwich wall as illustrated in the FIGURES 2 through 6, a second sheet is involved. An exterior sheet 23, which may be corrugated or ribbed, is employed as the outside surface of the wall. It will be readily apparent that the aesthetic value of the building as well as practical operating considerations would be drastically disturbed if the studs did not appear at proper location to be impaled through the bottom of the rib areas as illustrated in FIGURES 5 and 6.

Hence, as shown in the FIGURE 1, the tape is provided with a series of indicia marks 30 placed on exact 8-inch centers. The tape, although it might be constructed of metal having a relatively high coefficient of expansion, such as aluminum, nevertheless is relatively stable dimensionally within the limits required for spacing of such studs. Therefore, by placing the tape upon the surface 18, quite smoothly, the indicia marks 30 are brought to exact 8-inch centers across the surface 18; and the studs 17 can be placed accurately on these centers without the use of any templating devices whatsoever. The advantage of this provision of a template which provides fluxing action and corrosion insulation is of great magnitude to the building industry.

The modification of the tape as set forth in FIGURE 7 is shown to illustrate how punch-out holes 15 are provided for the purpose of serving as indicia marks wherein the extra fluxing action of the tape is not desired, or the tape is provided of material incapable of serving efficiently as a fluxing agent.

The FIGURE 9 is employed to illustrate an alternate type of stud 35 having a screw end 36. It is not always possible or practical to provide welded studs, as in the preferred illustrations and hence such screw attached stud 35 is acceptable in many instances as a fastener. Likewise, FIGURE 10 illustrates a stud 37 having a screw end 38. The stud 37 is of reduced central section and a hexagonally shaped tightening collar 39 is employed to receive a wrench for screw tightening the stud to a support surface.

The FIGURES 11 and 12 are provided to illustrate the use of the improved tape in conjunction with the screw type stud fasteners 35 and 37. Although such studs 35 and 37 may be employed in the sandwich wall construction of FIGURES 3 through 6, they are illustrated in a single wall construction with a single sheet 40 for the purpose of setting forth a single wall construction.

Hence, when used with the screw type fastening the tape is not employed as a fluxing agent; and when employed in a single wall construction the tape is not as important as a spacing template, although still quite useful as such. Nevertheless, the tape still provides a very inexpensive and efficient corrosion insulation to prevent the sheet 40 from corroding with respect to the support surface.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

The method of constructing a building panel, comprising the steps of, providing a structural frame of steel and a covering sheet of aluminum, providing a foil strip of aluminum, applying said foil strip of aluminum to the steel structural frame by an adhesive material positioned between the foil and steel providing a steel stud weldable by end arc weld procedures, applying an electro-potential between said stud and said steel frame and thereby drawing a welding arc from the steel frame to the stud through the foil, seating the stud to the frame to consummate an end weld, and finally placing the sheet structure of aluminum against the foil surface with the welded stud extending through an opening in the sheet structure and securing said sheet structure in position by securing the sheet on the end of the stud, whereby the aluminum foil serves as a burnable fluxable material for the welding action of the stud to the frame to assist in better welding the stud and whereby the foil remaining serves as a barrier between the aluminum sheet cover and the structural steel frame to prevent corrosion therebetween after the panel is assembled.

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