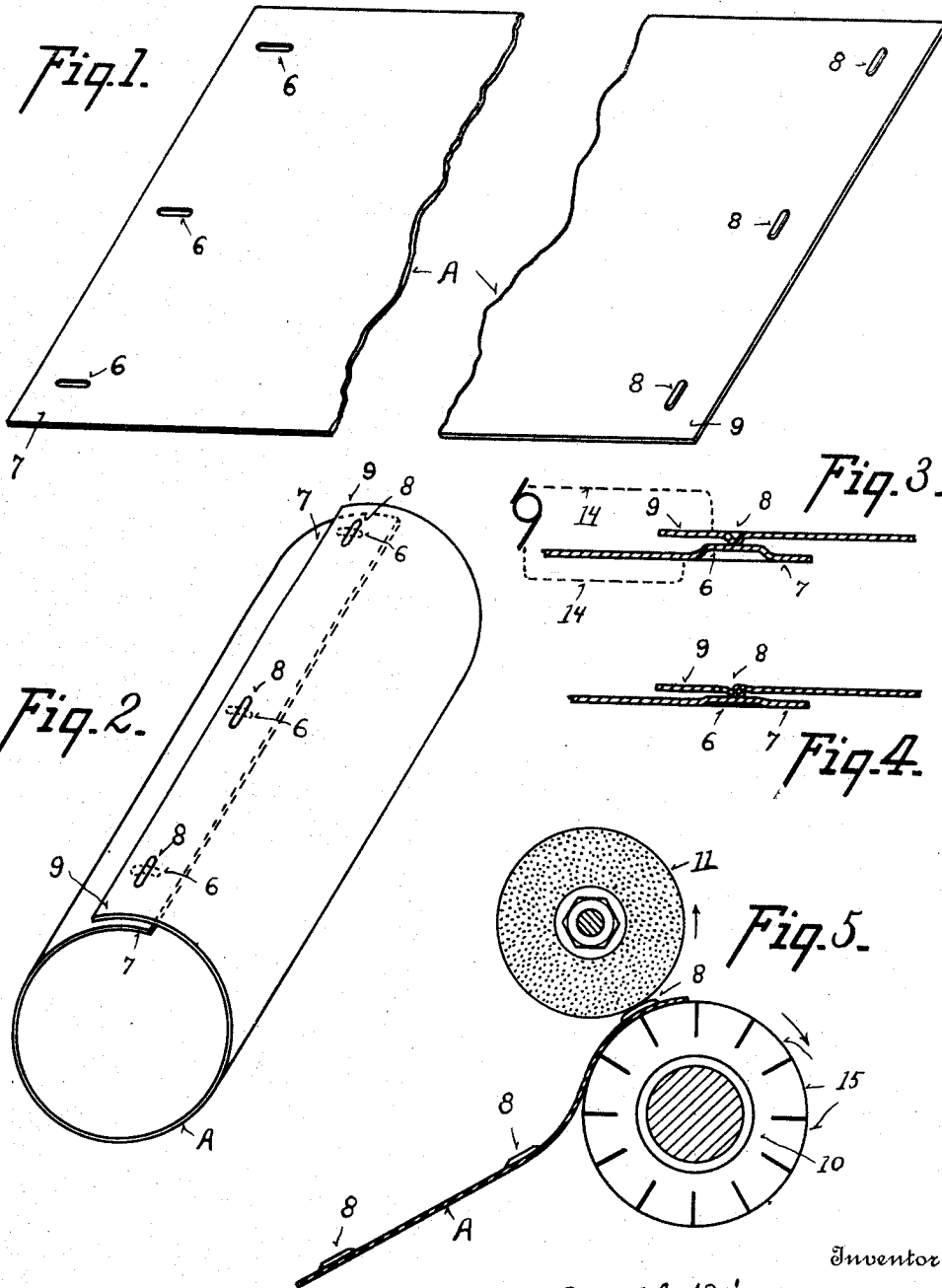


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SHEET METAL JOINT AND METHOD OF PRODUCING SAME.
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SHEET-METAL JOINT AND METHOD OF PRODUCING SAME.

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To all whom it may concern:

Be it known that I, ADOLF DIECKMANN, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Sheet-Metal Joints and Methods of Producing Same, of which the following is a specification.

My invention relates to improvements in joints for sheet metal articles, and method of forming the same. One of its objects is to provide an improved seam joint for sheet metal tubes and other articles. Another object is to provide for reliably and conveniently securing local or intersecting contact surfaces at the points where the metal is to be first united. Another object is to reliably and conveniently clean the metal contact surfaces where it is required before uniting the metal to form a joint or seam. Another object is to provide for clean metal contact surfaces where coated sheets are employed. Another object is to provide joints which will serve to locally fuse together the body portion of coated sheets and provide for subsequently closing other portions of the joint by dipping or similar operations. My invention also comprises certain details in the article and method of procedure, all of which will be fully set forth in the description of the accompanying drawings in which:

Figure 1 is a perspective view of a sheet partially prepared to form a sheet metal tube and employing my improved method.

Fig. 2 is a perspective view of a tube formed from the sheet of Fig. 1 and ready to unite the overlapped sections to form a joint or seam.

Fig. 3 is a sectional detail illustrating the method of uniting the joint sections.

Fig. 4 is a sectional detail illustrating a modification of Fig. 3.

Fig. 5 is a diagram illustrating the method of cleaning the contact faces preparatory to forming a joint.

My improved method relates primarily to the preparation, and where necessary, cleaning of those portions of the sheets where the joints are to be formed so as to insure local metal contact faces clean or in condition to unite the body metal of one section to the body metal of the other section even though the faces of the sheets may primarily be covered with a film of metal differing in

character from the body of the sheet, or may be covered with a film of oxid or other substance tending to prevent a union at the point or points desired, and comprises primarily the formation by stamping or similar operation of one or more slightly raised or projecting elongated and relatively transversely directed areas on the respective sections to be joined, which when brought into relation to each other will automatically contact at a narrow area of intersection, which may occur within a considerable range lengthwise of said projections. The method also comprises the cleaning of the faces of these projections, if necessary, by abrasion or similar operation; and the uniting of the projections by fusion at their points of intersection when brought together, by electrical or similar application of heat, and if desired the subsequent application of a protecting coating of metal, enamel, or similar material by a dipping or similar operation, to protect the fusion joints and to secure a fluid tight joint.

In the manufacture of conductor pipe and elbows, and a considerable variety of other sheet metal structures, which are to be subsequently galvanized, it is customary to primarily employ "terne plates," that is iron or steel plates which have been dipped in a bath of molten lead after the scale and oxid have been first removed. Such plates may be stored for long periods without deterioration, but it has been impractical heretofore to practically unite or seam them by electrical welding or similar methods designed to unite the iron of one section to the iron of the other section, due to the chemical and physical nature of the intervening coating. Also a considerable variety of articles might be manufactured directly from "black iron" or uncleaned and uncoated iron or steel sheets, except for difficulties heretofore encountered in reliably securing local contacts of the desired dimensions together with intervening coatings of scale and films of oxid and other chemical substances thereon, tending to prevent a union of iron to iron by electrical welding or similar operations.

In order to overcome these difficulties and provide a convenient and reliable method of securing local contact surfaces providing clean surfaces when required and uniting the contact faces, I provide by a suitable stamping or rolling operation one or more

relatively narrow and elongated surfaces 6 projecting slightly from the face of the sheet on one side of the section or member 7 to be united, and one or more similar relatively narrow and elongated surface projections 8 projecting slightly from the other section or member 9 to be united. These raised surfaces are preferably so arranged that when brought face to face to form a joint they will occupy positions at substantially right angles to each other, and due to their greater length in one direction than the other will intersect and their faces will meet over a limited area at some point along their respective lengths without necessitating extreme accuracy in matching or uniting by contact the meeting faces of the sections 7 and 9.

After the projections 6 and 8 have been formed their faces may be in condition to be united by fusion, otherwise the sheets are fed over a supporting cylinder 10, or if desired over a support or table having a plane face, so as to bring the projections 6 successively in contact with a rapidly revolving abrasive wheel 11, which serves to remove the metal coating, the scale, or chemical film, and to provide a clean and level surface of iron or steel extending the width and length of said projections 6. The series of projections 8 are then successively fed into contact with the abrasive wheel and cleaned. As illustrated in Fig. 5 the sheet supporting member 10 is provided with a series of electromagnets 15 to hold the sheet firmly in contact with the face of member 10 during the abrasive and cleaning operation. Mechanical means may be employed if desired to hold the sheet in contact with its supporting member 10 while being cleaned.

The cleaned projections, or those formed on sheets which require no especial cleaning operation, are next brought into contact with each other at a point of intersection for each pair of projections as indicated in Fig. 3, which in the formation of a tube or elbow blank may be effected by rolling the sheet A Fig. 1 into a tube as indicated in Fig. 2, preferably over a mandrel of suitable size and material preferably wholly or partially of insulating material. An application of an electric current 14 to the intersecting joints is then made successively or collectively by means of a plunger or roller to cause the metal, iron or steel, to fuse together at the joint intersections. If desired the plunger or roller pressure applied to the joint may be sufficient to cause a partial or total collapse of the projections 6 and 8 at or subsequent to the instant of fusion as indicated in Fig. 4. Such application of extra pressure is not ordinarily considered necessary, as the extent of the projections 6 and 8 is originally slight, and a subsequent galvanizing or dipping coat will en-

tirely fill and close the space between the overlapped sections 7 and 9.

After the fusion of the projections 6 and 8 together, if terne plate has been employed, the article is in condition to be galvanized or tinned, or if tin coated sheets have been employed, another coating of tin may be applied either of which will fill and close the joint spaces between the sections 7 and 9 and surrounding and inclosing the fused sections, thus rendering the joint fluid tight and corrosion resisting.

Where black iron sheets are employed, after the fusion operation the articles are subjected preferably to an electrolytic or other suitable cleaning bath and operation to remove the scale and chemical films and then given a coat of tin, zinc, or enamel to close the remaining portions of the joint and render it fluid tight, and to afford a corrosion resisting surface.

My improved joint and method provides for uniting a variety of sheets of different character which have heretofore resisted practical treatment, and provides a very rigid and reliable joint due to the union of iron or steel to a like material. Also the subsequent coating effectually protects the iron or steel joint from corrosion and renders the joint fluid tight. The method and joint herein illustrated and described are capable of considerable modification without departing from the principle of my invention as defined in the appended claims.

What I claim is:

1. The method of forming sheet metal joints which comprises forming projections on the respective faces to be united, cleaning the faces of said projections, bringing said cleaned faces into contact and uniting them by fusion, and subsequently coating the article to inclose and protect the fused joint.

2. The method of joining previously metal coated plates which comprises forming projections on the respective faces to be united, removing the metal coating from the faces of said projections, and bringing said uncoated faces into contact and uniting them by fusion.

3. The method of uniting previously coated metal plates which comprises forming projections on the respective faces to be united, abrading said projections to remove the previous coating from the face of said projections, and bringing said uncoated faces into contact and uniting them by fusion.

4. The method of forming sheet metal joints employing previously metal coated stock, which comprises forming elongated relatively transversely arranged projections on the respective faces to be united, removing the metal coating from the faces of said projections, and bringing said uncoated

faces at an intersection thereof into contact and uniting them by fusion at such intersection.

5 The method of forming sheet metal joints which comprises forming elongated relatively transversely arranged projections on the respective faces to be united, cleaning the faces of said projections, bringing said cleaned faces at an intersection thereof
10 into contact and uniting them by fusion at such intersection, and subsequently coating the article to complete the joint.

6. The method of forming sheet metal joints employing previously metal coated
15 stock which comprises forming a series of elongated relatively transversely arranged projections on the respective faces to be united, removing the metal coating from said projections, bringing said uncoated
20 faces at an intersection thereof into contact; uniting them by fusion at such intersections, and applying a metal coating to close the remaining portions of said joint and to recoat the uncoated and otherwise exposed faces of
25 said projections.

7. The method of forming sheet metal joints which comprises forming elongated relatively transversely arranged projections on the respective sections to be united,
30 bringing said projections at an intersection

thereof into contact, uniting said projections by fusion, and subsequently coating the article to inclose and protect the fused joints.

8. A sheet metal joint comprising relatively transversely arranged projections on the respective joint sections united at their intersection by fusion and having a coating material surrounding and protecting said fusion joint. 35

9. A sheet metal joint comprising relatively transversely arranged projections in pairs on the respective joint sections united at their intersections by fusion, and having a coating material uniting said joint sections intermediate of said fused joints.

10. A sheet metal joint uniting previously metal coated plates, which comprises local areas in which the body of one joint section is united by fusion to the body of the opposite joint section, and a coating material uniting the remaining portions of one joint section to the opposite joint section.

In testimony whereof I have affixed my signature in the presence of two witnesses.

ADOLF DIECKMANN.

Witnesses:

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C. W. MILES.