

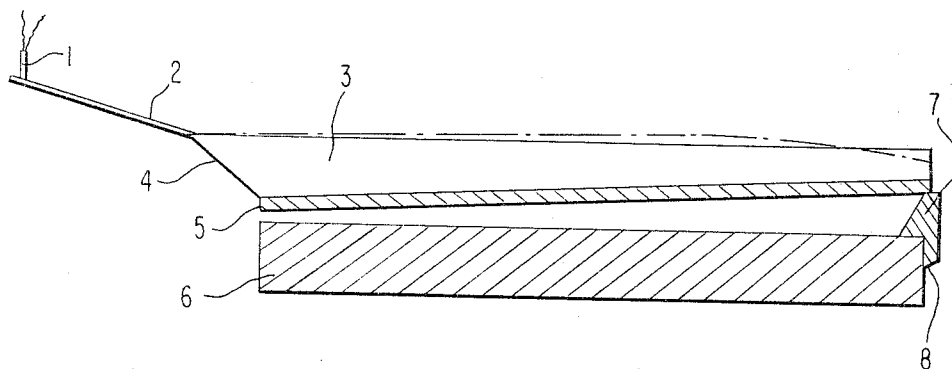
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METHOD FOR CONNECTING METAL PLATES

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1

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METHOD FOR CONNECTING METAL PLATES
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The present invention relates to a method for connecting metal plates, and more particularly to a method for surface-connecting metal plates by means of explosives.

It is known that metal plates may be welded with each other by means of an explosive in that the explosive is placed on the one or both metal plates, which are to be welded with each other, in a uniform layer and is thereupon ignited. The two plates are so securely pressed against one another by the percussion jolt or detonation shock that they are welded with each other. This prior art welding method, however, is suited only for relatively small and/or thin plates; for with the attempt to apply this plating method industrially, it has been discovered that with large metal plates, for example, 2 x 5 m. of a thickness of, for instance, 2–10 mm. or of, for example, 1 x 2 m. of a thickness, for instance, of 10–40 mm., these plates are connected only in places, principally in the center, whereas the edges thereof are not connected at the ignition place, at the opposite end and at the sides. This, however, entails high costs by the separation of the non-connected zones and by the large waste.

It has now been discovered that one may avoid the aforementioned disadvantages if one operates in the manner that the height of the explosive layer decreases on the upper metal plate from the ignition side or ignition corner extending over the plate by about 50 to 70% and if the height of the layer along the sides adjoining the ignition side or ignition corner extends lower or decreases in strip shape only by about 5 to about 20%, whereby the necessary spacing between the plates, possibly in an inclined position relative to the ignition side or ignition corner, is achieved by individual metal supports which are welded with a side ignition only to the opposite side whereas with a corner ignition along all the sides of the lower plate. The metal supports are constructed, for example, in the form of a right-angle triangle. Upon the detonation, the upper plate then slides along the hypotenuse and laterally pushes away also the welded-on supports.

With a side ignition, the explosive is so arranged appropriately at the ignition side by an obliquely arranged metal plate that the shock wave after the ignition impinges on the upper plate in an obtuse angle. The metal plate is thereby placed on the upper plate and is secured along the lateral supports consisting of wood or cardboard, for example, by adhesive strips. The metal plate thereby flies to the rear during the detonation of the explosive. The explosive that may be used may be either in plate, powder, or plastic form. The height of the explosive layer and the slope angle depend on the used explosive, the size and the thickness of the plate and the metal to be plated. Spacing of the plates is also conditioned by the size thereof and the thickness thereof. The ignition may take place by means of an arrangement for producing a plane detonation front or from a corner, the latter, however, only in case of square plates. An inclination of the upper plate is necessary only with a side ignition whereas with a corner ignition the plates may also be disposed parallel to one another.

According to the method of the present invention, completely satisfactorily connected plates of practically all metals and the most different sizes among one another or with plates of other metals, for example, corrosion-re-

2

sistant steels, chrome-nickel steels, titanium-steels, tantalum-steels, or lead, copper or aluminum with different boiler plates or other metals as well as noble metals of gold and silver or Monel metal on yellow brass or Tombac may be obtained.

Accordingly, it is an object of the present invention to provide a method for surface-connecting metal plates with each other which, by extremely simple means, avoids the shortcomings encountered with the prior art constructions.

Another object of the present invention resides in the method of surface-connecting, by means of an explosive, metal plates of any size and thickness.

A further object of the present invention resides in a method for surface-connecting metal plates by means of an explosive which is applicable to metal plates not only of the most varied sizes but also to metal plates of different materials including the different alloy steels, lead, copper, aluminum, as well as the noble metals, Monel metal, brass and Tombac as well as others.

A further object of the present invention resides in a method for surface-connecting metal plates by means of an explosive which is both economical as well as reliable in operation and avoids large waste.

These and other objects, features, and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, in the single figure thereof, one embodiment in accordance with the present invention, the single figure being a schematic cross-sectional view through an installation for carrying out the method in accordance with the present invention.

Referring now to the single figure of the drawing which shows, for purposes of illustration only, one arrangement according to the present invention in cross section, reference numeral 1 designates therein a conventional known ignition means, reference 2 a triangle of explosive, reference numeral 3 the explosive, reference numeral 4 a metal plate, reference numerals 5 and 6 the metal plates to be connected with each other, and reference numeral 7 a triangularly shaped member of steel welded to the lower plate 6 at 8.

As example of one surface-like connection of metal plates, the connection of a Cr-Ni-steel plate of 20 mm. thickness with a boiler plate of 200 mm. thickness and of a size of 1 x 2 meters will be described hereinafter. The distance of the plates is at the firing place about 3 mm. at the opposite side about 20 mm. The upper plate rests on the said opposite side on 19 welded-on triangular supports of steel and of 5 mm. thickness which have a distance from one another of 50 mm. The distance of the plates at the firing place is attained by triangles of steel disposed on each side. These steel triangles need not be welded on. The explosive, 160 kg. of pentaerythritetranitrate, stabilized and granulated with 5% of Montan wax, is so distributed that it has a layer height at the ignition size of 80 mm., at the other open end of 50 mm. and laterally in a width of 150 mm. a height of 70 mm.

The dash and dot line in the drawing indicates the slope of the explosive height in parabolic shape, if one so desires. One obtains in both cases a uniform plate connection.

While I have shown and described only one embodiment in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to a person skilled in the art. As mentioned above, the various dimensions and/or amounts and types of explosives may be varied depending on the size of the plates and/or the type of materials used. However, since such changes are well within the purview and scope of a person skilled in the art, especially in view of the pre-existing knowledge

of surface-connecting plates by explosives, such modifications have not been described herein since they merely require a change in the prior art methods in those details described herein.

Thus, it is obvious that the present invention is not limited to the details shown and described herein but is susceptible of numerous changes and modifications as known to a person skilled in the art, and I, therefore, do not wish to be limited to the details shown and described herein, but intend to cover such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. A method for surface-connecting metallic plates disposed one above the other by means of explosives, comprising the steps of placing explosives on the upper metal plate in such a manner that the height of the layer of explosives decreases by about 50 to 70% from the ignition place extending over the upper plate and that the height of the layer of explosives decreases in strip-like manner only by about 5 to 20% along the sides thereof adjacent the ignition place.

2. A method for surface-connecting metallic plates disposed one above the other by means of explosives, comprising the steps of placing explosives on the upper metal plate in such a manner that the height of the layer of explosives decreases by about 50 to 70% from the ignition place extending over the upper plate and that the height of the layer of explosives decreases in strip-like manner only by about 5 to 20% along the sides thereof adjacent the ignition place, and maintaining a predetermined spacing between said two plates by securing metallic spacer supports to the lower plate at least along the side thereof opposite the side where the ignition takes place.

3. A method for surface-connecting superposed metal plates by means of explosives ignited substantially along one side thereof, comprising the steps of placing the explosives on the upper metal plate in such a manner that the height of the layer of explosives decreases by about 50-70% from the ignition side over the extent of the plate and that the height of the layer of explosives is decreased along the sides adjacent the ignition side in strip-shaped manner by only about 5 to 20%, and maintaining a predetermined spacing between said plates by securing metallic spacer supports to the lower plate only along the side opposite said ignition side.

4. A method according to claim 3, wherein said spacer supports maintain said plates inclined to each other.

5. A method according to claim 4, wherein the explosives are so arranged along the inclined metallic plate that the shock wave after ignition impinges on the other plate in an obtuse angle.

6. A method for surface-connecting superposed metal plates by means of explosives ignited substantially along one corner thereof, comprising the steps of placing the

explosives on the upper metal plate in such a manner that the height of the layer of explosives decreases by about 50-70% from the ignition corner over the extent of the plate and that the height of the layer of explosives is decreased along the sides adjacent the ignition corner in strip-shaped manner by only about 5 to 20%, and maintaining a predetermined spacing between said plates by securing metallic spacer supports to the lower plate along all of the sides of the lower plate.

7. An arrangement for the surface-connection of two metal plates by means of explosives which comprises an upper plate disposed above a lower plate, a layer of explosives positioned on the upper plate, the height of said layer decreasing from the place of ignition by about 50 to 70% over the extent of the upper plate and the height of the layer of explosives decreasing by about 5 to 20% along the sides thereof adjacent the place of ignition.

8. The arrangement of claim 7, wherein the decrease in height of the layer of explosives adjacent the place of ignition is in a strip-shaped manner.

9. The arrangement of claim 7, wherein an ignition means is disposed at the place of ignition which is along substantially one side of the layer of explosives.

10. The arrangement of claim 9, wherein spacer support means are secured to the lower plate along the side thereof opposite to the ignition side.

11. The arrangement of claim 10, wherein said plates are maintained in an inclined position relative to each other.

12. The arrangement of claim 1, wherein an ignition means is disposed at the place of ignition which is at one corner of the layer of explosives.

13. The arrangement of claim 12, wherein spacer support means are secured to the lower plate along all sides thereof.

14. The arrangement of claim 13, wherein said plates are maintained substantially parallel to each other.

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