R. Mattice

Method of Repairing Cracked or Broken Structures by Electric Welding

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Fig. 1

Fig. 2

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By

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To all whom it may concern:

Be it known that I, ROYAL MATTICE, a citizen of the United States, residing at Bethlehem, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Repairing Cracked or Broken Structures by Electric Welding, of which the following is a specification.

This invention relates to the method of repairing cracked or broken structures by welding and has particular reference to the repair of double walled structures generally.

While this invention has been practiced specifically in the repair of cracked or broken tops of hot blast stoves and the drawings show generally such a structure, it is obvious that the herein disclosed method is adaptable for the repair of any double walled structure, and I desire it understood that this invention is not restricted solely to the repair of hot blast stove tops and wherever mention is made of stove tops it is merely by way of example.

Metallic structures which are subjected to heat will crack from continual expansion and contraction and particularly is this true of hot blast stoves.

Heretofore attempts have been made to repair the cracked structures by acetylene welding but it has been found that if the old crack did not reappear in the structure new cracks appeared adjacent the weld. Fire clay was resorted to to fill up the crack and a plate then clamped over the repaired surface by screws or the like. This method proved unsatisfactory.

In the case of hot blast stove tops, the type illustrated being double walled, if the crack appeared in the lower section it has heretofore been almost an impossibility to repair the same chiefly because of the fact that there is only about three inches between the walls.

It is therefore one object of this invention to provide a method for the repair of cracked double walled structures.

It is a further object of this invention to provide a method for repairing cracked or broken hot blast stove tops.

It is a still further object of this invention to provide a method of repairing cracked or broken double walled structures such as hot blast stove tops or the like by electric welding.

Other objects and advantages of this invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a sectional view of a hot blast stove top.

Figure 2 is a fragmentary front elevation, partly in section, of another portion of a stove top.

Referring now more particularly to the drawings, A designates a hot blast stove top in its entirety, the same comprising an upper section 1, a lower section 2 and a stack 3, the latter secured to section 1 by bolts 4 or the like.

The upper and lower sections 1 and 2 are spaced from each other a distance of approximately three inches, in stoves of present day usage, and the upper section 1 is supported by means of a plurality of webs 5, each provided with a brace 6. It is to be understood of course that both the sections 1 and 2 are provided with a central opening, communicating with stack 3, and that braces 6 are substantially arcuate in shape and are spaced each from the other, circumferentially around the opening.

It has been found that due to expansion and contraction, the upper sections 1 and 2 crack, and also that braces 6 and webs 5 often crack.

In Figure 1 reference characters 7 designate cracks in section 2, 8 designates a crack in section 1, and 9 designates cracks in brace 6.

Referring to Figure 3, where is shown the method of repairing section 2 when cracked as shown at 7, in Fig. 1, it will be apparent that because of the very small space between sections 1 and 2 it is difficult to make a satisfactory repair of the cracked surface. In view of this the first step in my method is to remove a portion of section 1 by any suitable means, such as, an oxyacetylene torch, the section 10 shown in Figure 3 being removed thus exposing the crack 7.

If only section 2 is cracked a portion of the metal of section 1 immediately above the crack is removed, and if both sections 1 and 2 are cracked a portion of section 1 above the crack in section 2 and including the cracked metal of section 1 is removed.

As the next step in my method, I cut a V in the metal of section 2, or in other words 11 I remove a portion of section 2 forming an opening therethrough, the portion removed
including the metal in which the crack appears. The opening provided is indicated between the dotted lines 11 in Figure 8, such opening being of sufficient size to permit a pad 12 to be inserted through the opening and held in place against the lower face of section 2, covering the opening just formed. The pad 12 is held there against by any suitable means and I then weld the opening indicated between lines 11, preferably by electric welding, the opening being completely filled as shown at 13. The weld forms with section 2 and pad 12, an integral structure and the formerly cracked section 2 has now been repaired. It is obvious that any surplus metal of the weld may be removed by any suitable means.

As a final step in this method, I chamfer the edge of section 1 at the opening formed by the removal of portion 10 and if portion 10 is a sound piece of metal I chamfer the edge thereof. The portion 10 is then supported in position in the opening and is then welded to section 1 as shown at 14, thus reforming section 1. If the portion 10 which has been removed in the early steps of the process is cracked it is only necessary to provide a new piece of metal of proper size and weld the same in position in the opening formed by the removal of the portion 10.

It has been found more practical to carry out the method just described by electric welding as the degree of heat necessary to effect a practical weld can be controlled with much greater accuracy than can heat of any other welding process and a far more efficient weld obtained.

From the above description it is believed that the method will be obvious to those skilled in the art but I desire it understood that the drawings are merely by way of example and that the herein described method of repair is applicable generally to any metallic double walled structure. It is further to be understood that various changes may be made within the scope of the appended claims without departing from the spirit of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of repairing double-walled metallic structures having a crack in the lower wall thereof which comprises, removing a portion of the upper wall above the crack, removing a portion of the lower wall adjacent the crack, filling the opening thus formed in the lower wall, and finally welding the portion which has been removed from the upper wall into position in said upper wall.

2. The method of repairing double-walled metallic structures having a crack in the lower wall thereof, which comprises, removing a portion of the upper wall above the crack, removing a portion of the metal of the lower wall adjacent the crack forming an opening in said wall, filling the opening by welding, and finally welding the portion which has been removed from the upper wall into position in said upper wall.

3. The method of repairing double-walled structures having a crack in the lower wall thereof, which comprises removing a portion of the upper wall above the crack, removing a portion of the lower wall adjacent the crack forming an opening in the said lower wall, securing a pad to said lower wall, said pad covering said opening, filling the opening by welding, said pad being welded to the metal of the weld and the lower wall, and replacing the portion previously removed from the upper wall, and finally electrically welding said portion to said upper wall.

4. The method of repairing cracked or broken double-walled structures by welding, which comprises, removing a portion of the upper wall above the crack or break, removing the cracked or broken surface, reforming the cracked or broken surface by welding, and finally replacing the portion previously removed from the upper wall and welding the same to the upper wall.

5. The method of repairing cracked or broken double-walled structures by electric welding which comprises, removing a portion of the upper wall above the crack or break, removing the cracked or broken surface, forming an opening through said lower wall, securing a pad to the lower face of said lower wall, said pad covering said opening, electrically welding said pad to said lower wall and filling said opening, and finally electrically welding the portion previously removed from the upper wall back into position in said upper wall.

In testimony whereof I hereby affix my signature:

ROYAL MATTICE.