

No. 815,985.

PATENTED MAR. 27, 1906.

J. STRAUSS.
METHOD OF MAKING ARMOR PLATE.
APPLICATION FILED MAR. 31, 1905.

Fig. 1.

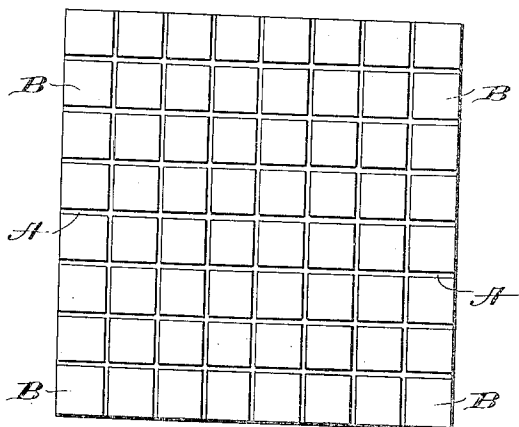


Fig. 2.

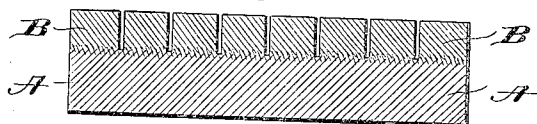
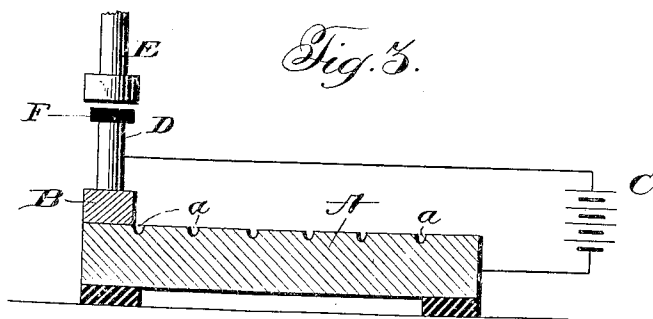


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING ARMOR-PLATE.

No. 815,985.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed March 31, 1905. Serial No. 253,187.

To all whom it may concern:

Be it known that I, JOSEPH STRAUSS, of Washington, in the District of Columbia, have invented a certain new and useful Improvement in Methods of Making Armor-Plate; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a face view of a piece of armor-plate embodying my invention; Fig. 2, a cross-section of the same; and Fig. 3, a view in the nature of a diagram illustrating apparatus for welding.

The object of my invention is to provide a method of constructing armor-plate which, besides possessing other advantages, will result in a product possessing a hard outer or exposed surface, which will not flake off from the impact of a projectile striking the same, other than to a very limited extent, and having a tough inner portion; and to this end my invention consists in the method of making armor-plate substantially as hereinafter specified and claimed.

The desideratum in armor-plate is a hard exterior or exposed portion, sufficiently hard and thick to prevent penetration of projectiles striking it, and having a tough inner portion capable of withstanding the racking strains to which the plate is subjected from the impact of projectiles. As well known, armor-plates have been constructed to fulfil these conditions both by a cementation process producing a decremental carburization of the plates from the outer face inward and by attaching or fastening to a large body of soft steel small plates of hard steel, the armor-plate thus being a built-up or composite structure. By my invention I secure better results than are possible by either of the methods mentioned or by any other known to me, and in what I consider its best embodiment my plate in general respects is similar to those produced by the second-mentioned method—that is to say, as will be seen by reference to the drawings, it consists of a body or piece A, of the usual size, of a tough steel, and smaller plates or pieces B, of very hard steel, that constitute the face or exposed side of the armor-plate. I join or unite the large tough body-piece A and the small hard plates B, by electric welding, as by welding them by means of electricity not only can a most perfect union be secured, so that what is essentially an integral structure can be pro-

duced, but there will be a diffusion decrementally of carbon from the hard small plates to the large plate of tough steel, this decremental diffusion of the carbon being obtained by proper manipulation of the temperature of the plates. The hard small plates will thus be united to the tough back by a stratum of metal that is decrementally carburized, and, as has before been said, the product is essentially an integral one. Besides the diffusion of carbon from the hard small plates to the tough back the heating of the portion of the latter next the small plates will result in the mixing with the hot portions of the latter of alloys or elements that give the tough back its characteristics, so that its characteristics in some degree will be imparted to the small plates. The use of the small hard plates is important, because such size renders possible their perfect welding by electricity to the tough back. To secure the best results in the decremental carburizing of the stratum or section uniting the small hard plates and the tough back, it is desirable to exclude the air from the heated portions.

It is of course immaterial to the practice of my method what kind of apparatus for electric welding be employed; but in Fig. 3, in a conventional or diagrammatical way, I illustrate apparatus for welding the hard plates B to the body-piece A, which apparatus includes a source of electricity C, one pole of which is connected to the body-piece A and the other to a bar D, adapted to bear upon a hard plate B to be welded, to which bar D pressure is applied by a power-operated plunger E, so as to press the two pieces to be welded together with the necessary force to effect their union. The post D and plunger E of course have a body of insulating material F interposed between them, and the body-piece A is supported by some suitable non-conductor.

To insure the satisfactory welding of two pieces of metal by electric welding, it is essential that the surfaces of the two pieces to be joined shall be raised to the same or approximately the same temperature. To secure such equal temperature, it is necessary that the resistance of the two surfaces shall be the same. In order to secure like resistance, I employ means so that the area of the portion of the body-piece A to which a block B is to be joined shall be the same or approximately the same as the area of the abutting

surface of said block, so that the same quantity of current will pass to such area of the body-piece A as to the abutting surface of the block B. The means I illustrate for this purpose consists of grooves *a*, cut or otherwise formed in the face of the body-piece A to which the blocks B are to be joined, which subdivide such face into surfaces of similar form and area to the abutting surface of a block B, the grooves *a* being of such depth and magnitude that the current passing through the body-piece A will be obliged to leave the body-piece from an area circumscribed by the area of the abutting face of a block B. Besides the control of the current, so as to insure uniform or approximately uniform resistance at the surfaces to be welded, the grooves *a* also contribute to uniformity of temperature of the two surfaces by preventing the lowering of the temperature of the portion of the surface of the body-piece A to be heated by conduction.

Besides facilitating the welding operation and enabling the production of perfect results the use of the small plates is of extreme importance, because when the armor-plate is struck by a projectile the flaking off of the outer portion thereof if it occurs will be very limited in extent, because it will involve only the surface plate or plates struck. Preferably slight spaces are left between the small plates to prevent any tendency of them to flake off from the impact of a projectile, such tendency being obviated when the armor-plate is bent or dished by the blow of a projectile, because of the relative movement toward each other of the hard plate or plates that are involved that is possible by reason of the existence of spaces between them. In the absence of such spaces they would impinge upon and crowd each other upon the dishing of the armor-plate, with the result that they might be flaked or torn off. It is possible with my invention to have the outer hardened portion of the armor-plate thicker than is the case of armor-plate having a

tation, because hard outer pieces can be employed for the outer portion of my plate having a thickness greater than the depth to which a plate can be hardened by cementation.

It is to be understood, of course, that the scope of my invention is not limited to hard plates of any number or size or shape nor to any particular relative thickness of the tough back and the hard outer portion of my armor-plate.

Having thus described my invention, what I claim is—

1. The method of making armor-plate, which consists in electrically welding two metal plate-form members of different degrees of hardness.

2. The method of making armor-plate, which consists in electrically welding tough-steel and hard-steel plate-form members.

3. The method of making armor-plate, which consists in electrically welding to a tough body-plate a plurality of small plates.

4. The method of electrically welding small and large plates, which consists in localizing the current where the two plates abut, so that the area of the surface of the large plate, subjected to the action of the current, shall not be substantially greater than the area of the abutting surface of the small plate.

5. The method of electrically welding small and large plates which consists in dividing the surface of the large plate, to which the small plates are to be welded, by channels or grooves, placing the small plates on the large plate so that a small plate will be circumscribed by the grooves or channels and then passing a current through the abutting surface of the plates.

In testimony that I claim the foregoing I have hereunto set my hand.

JOSEPH STRAUSS.

Witnesses:

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