UNITED STATES PATENT OFFICE.

JACK CHURCHWARD, OF NEW YORK, N. Y., ASSIGNOR TO WILSON WELDER & METALS COMPANY, INC., A CORPORATION OF NEW YORK.

ELECTRICAL-ARC WELDING.

1,335,875. Specification of Letters Patent. Patented Apr. 6, 1920.

No Drawing. Application filed January 14, 1920. Serial No. 351,359.

To all whom it may concern:

Be it known that I, JACK CHURCHWARD, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Electrical-Arc Welding, of which the following is a specification.

My invention relates to electric arc welding and one object is to deposit metals which will be inert to the action of corrosive chemicals such as hot lye, soda, potash, sulfuric acid and organic chemicals. According to my invention I employ an electrode, which serves not only to conduct the current and supply heat to the arc, but also supplies the non-corrosive metal to be deposited by the welding process.

My invention may be applied in many ways. The following examples are given by way of illustrating its application, but I desire it to be understood that they do not limit the scope of the invention. One example of the use to which my invention may be put is in the repair of cracks, cavities and the like, which often occur in cast-iron tanks such as are used, for example, in various chemical manufacturing industries. These cast-iron tanks are generally made with a high silicon content and, hitherto, when such tanks were broken, it was so difficult to repair them that in many cases it was necessary to scrap the tanks. In attempting to repair such tanks, the voids in the tanks have formerly been filled by welding in the ordinary way; but the tanks repaired in this manner have been extremely short lived owing to the rapid eating away by the acids, alkali or other chemicals, of the metal which had been deposited. For this reason, this repair method has been unprofitable.

According to my improved method, the steel is deposited in the crack or void in the ordinary way but so that the surface of the weld is below the surface of the inside of the cast-iron tank. An electrode of non-corrosive metal is then substituted for the original steel electrode and the remainder of the crack or void is completely filled and preferably an additional amount of non-corrosive metal is deposited so as to entirely cover and overlap the original hole in the tank. The tendency for electrolytic action caused by the union of the two dissimilar metals does not appear to materially affect the weld. In fact, on account of the greater solution tension of the cast-iron, the electromotive force of the electrocouple is of such a character that the non-corrosive metal is actually protected and it has been found in practice that tanks prepared in this manner can be used over again and remain in service for a very considerable length of time. In many cases the surface of the non-corrosive metal becomes coated by the action of the chemicals in the tank, preventing to a large degree the action of the electrolyte or corrosive chemical as the case may be.

Among the non-corrosive metals which may be employed within the spirit of my invention, the following may be mentioned: nickel, copper, gold and silver. It is also within the spirit of the invention to employ alloys of various kinds as, for example, Monel metal. Monel metal is a white alloy—a natural combination of about 67% nickel, 28% copper and 5% other metals, chiefly iron and manganese. It contains no zinc. The nickel and copper bear the same relation to each other in the ingot of refined metal as in the ore when taken from the mine. Monel metal is especially adapted for use in my invention as the electrode on account of the fact that it withstands acids, alkali, high temperatures and erosive action of hot gases and superheated steam. It can be easily cast, forged, rolled, drawn and machined into the form of electrodes.

When welding with an electrode of Monel metal, it is preferable, although not necessary, to coat the electrode with lime. This may be accomplished by dipping the electrode in a saturated solution of milk of lime and allowing it to dry, whereby a thin adherent coating is formed.

Another use to which I may apply my non-corrosive electrode is in the lining of metal tanks in various industrial installations where it is impossible to electroplate or otherwise coat the tanks. For example, metal tanks are often situated in out of the way locations where it would be difficult or impossible to coat them by electroplating, but by the use of my invention metal may be readily deposited by electric welding upon the interior of the tanks. Furthermore, it may often be desired to build up a non-corrosive tank out of sections, said sections be-

ing joined together by welding with my electrodes. Monel metal is particularly advantageous for this purpose.

I do not desire to be limited to the use of any of the metals mentioned herein, but it is to be understood that any electrode of non-corrosive metal may be employed.

I claim:

1. A method of repairing a leaky cast-iron tank having a crack or cavity therein comprising partially filling the crack or cavity with metal deposited from a steel electrode, and filling the remainder of the crack or cavity with metal deposited from an electrode of Monel metal.

2. A method of depositing metal upon a plate by electric arc welding which comprises first depositing from a steel electrode, and then depositing from an electrode of a metal which is electropositive to iron.

3. A method of metallic arc welding which comprises depositing metal from an electrode upon the surface of another metal, the electrode metal being electro-positive to the other metal.

4. The method of electric arc welding which comprises depositing an acid resistant metal from a metallic electrode.

5. As a new article of manufacture an electrode for metallic arc welding consisting of a non-corrosive metal.

6. As a new article of manufacture an electrode for electric arc welding for producing non-corrosive deposits consisting of Monel metal.

7. As a new article of manufacture an electrode for electric arc welding for producing non-corrosive welds containing from 60–67% nickel and 28–40% copper.

8. As a new article of manufacture an electrode for electric arc welding for producing non-corrosive welds, consisting of Monel metal with a coating of lime.

9. An electrode for electric arc welding consisting of a metal which will withstand acids, alkali, high temperatures and the erosive action of hot gases and superheated steam.

In testimony whereof I have affixed my signature to this specification.

JACK CHURCHWARD.