

# ALIEN PROPERTY CUSTODIAN

## SLAG-FORMING MATERIAL FOR AN ARC-WELDING ROD AND METHOD FOR THE MANUFACTURE THEREOF

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My invention relates to slag-forming material for an arc welding rod and to the manufacture thereof and this application forms a division of the U. S. Patent Serial No. 321,324 to J. Sack et al filed February 28, 1940.

The welds produced by welding rods having a coating of slag-forming material are not always satisfactory, but frequently have an outer porosity, i. e. have several holes in the surface. Although the production of this outer porosity depends to a large extent upon the type of welding rod used, the conditions under which the welding is effected also has a great influence. For example, if the welding rod is moved rapidly during the welding, whereby higher welding currents may be used, the outer porosity is likely to occur, particularly in the case of fillet welds. This outer porosity is, of course, very detrimental mainly because it decreases the mechanical strength of the weld.

The main object of my invention is to prevent or at least to greatly reduce, the occurrence of outer porosity in welds.

In the application, Serial No. 321,324 of February 28, 1940 the following is described.

Distinction may be made between "sulphur-sensitive" and "sulphur-insensitive" welding rods having an iron or steel core provided with slag-forming coating, and that with welding rods of the "sulphur-sensitive" type the sulphur content of the iron or steel core and of the slag-forming coating thereof has a great influence upon the occurrence of outer porosity in welds made when using such rods.

Whether a welding rod is of the "sulphur-sensitive" or "sulphur-insensitive" type can be ascertained, by adding sulphur to either the metal core or the slag-forming coating, or to both and then determining, by welding with the rod, whether or not the addition of sulphur has had any appreciable influence upon the occurrence of the outer porosity. If there is no appreciable difference, the rod is of the "sulphur-insensitive" type, but if there is an appreciable change in the porosity, the rod is of the "sulphur-sensitive" type. The above-mentioned addition of sulphur may be effected by soaking the coated rod for about 30 minutes in a saturated solution of sodium sulphate having a temperature of about 33° C., and then drying the rod.

Welding rods of the "sulphur-sensitive" type are generally found among the well-known rods having an iron or steel core and a slag-forming coating containing ferro-manganese together with ores, such as iron ores, manganese ores or titanium ores.

The application, Serial No. 321,324 of February 28, 1940 furthermore discloses to make the sulphur content of the iron or steel core of a "sulphur-sensitive" welding rod less than about 0.020%, preferably less than 0.15% and to make the sulphur content of the slag-forming coating less than about 0.015%.

If it is desired to produce welding rods whose sulphur content is very low, it is generally more economical to use metal core materials having a low sulphur content, for instance below 0.010%.

The welding rods according to the application Ser. No. 321,324 which may be used in a long length, such as an automatic welding, offer the advantage that the possibilities of welding without any danger of occurrence of outer porosity of the weld are increased, i. e. the number of types of welding rod that may be used with certain work pieces and conversely the number of forms of work pieces that may be welded with a certain type of welding rod are increased. In addition the welding rods may be moved rapidly over the work pieces and higher current than is normal may be used.

In accordance with my invention sulphur is removed from raw coating material the sulphur content of which is too high for the purpose set out above, to reduce the sulphur content, preferably to less than 0.015%, for example by washing the materials with a liquid in which the sulphates readily dissolve. For example, the pulverized iron ore used in making the coating, may be washed in boiling water to reduce the sulphur content thereof to about one third of its original value. The remainder of the sulphur is generally in a substantially insoluble form, which I have found is less harmful than sulphur in water-soluble form, but if desired, the ore may be subjected to a roasting operation prior to the washing in order to convert a large amount of the sulphur contained in it in an insoluble form into a soluble form which can be removed in the washing operation. By this roasting and washing method it is possible to reduce the sulphur content to very low values, i. e. the sulphur content of the slag-forming coating may be reduced to a value less than 0.012%, with less than 0.005% of the sulphur in an insoluble form.

Although I have described my invention with reference to specific examples, I do not desire to be limited thereto because obvious modifications will appear to one skilled in this art.

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