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SAND BLASTING.

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To all whom it may concern:

Be it known that I, JAMES H. GRAVELL, a citizen of the United States, residing at Elkins Park, in the county of Montgomery and State of Pennsylvania, have invented a new and useful Improvement in Sand Blasting, of which the following is a specification.

Sand blasting is the name applied in the arts to the process of strongly blowing an abrasive to the surface of work for the purpose of etching or cleaning. It is used extensively for removing sand and scale from metal in preparation for painting, soldering, welding and the like. The sand blast removes the external surface from the work, which when it happens to be iron or steel allows the work to rust rapidly due to the exposure of the virgin metal to the atmosphere. This rusting of the iron or steel is a great disadvantage in sand blasted work, and unless the work is used immediately after sand blasting, the object of the sand blast is defeated, in that the work has to be re-cleaned before it can be used. It often happens that castings, sand blasted at the foundry, and then shipped to the customer, are received in a very rusty condition, so that before being used the sand blasting operation has to be repeated.

The object of the present invention is to sand blast the work in such a way that it will to a great extent resist the rusting tendencies, and although metal sand blasted in accordance with the present invention cannot be considered rust proof in the full sense of that term, yet rusting is sufficiently delayed to enable the work to be shipped and stored without danger of its rusting and until such time as is convenient for further protecting the metal by oil, painting, plating and the like.

In sand blasting, it is customary to use sand, steel shot, carborundum and other abrasives as the cutting medium. When these materials are used for sand blasting, the surface of iron or steel soon rusts. I have discovered, however, that if materials having rust preventing properties are substituted, in whole or in part, for the common abrasives, there is sufficient of the rust preventing material left on the surface of the work to prevent the work from rusting. Such materials as potassium dichromate and tricalcium phosphate have this property to some extent. However these rust preventing materials are usually lacking in abrasive properties and although they operate to some extent they are not in all cases commercial propositions, but if this class of material is mixed with common abrasives, such as sand, they operate to good effect.

One of the best rust preventers known to me at the present time is phosphoric acid, but owing to its acid properties it cannot be utilized in ordinary sand blasting machines, due to its action on the metal parts, and as it is a liquid it causes the sand or other abrasives to clog in the machine. I have discovered, however, that the acid salts of phosphoric acid operate to advantage. That is, acid salts are dry and do not cause the sand to clog and do not affect the metal parts of the common sand blasting machine. The monophosphates of ammonium, sodium and calcium I find produce good results.

In the practice of my invention I may use one pound of monosodium phosphate to every ten pounds of sand. The phosphates and the sand are carefully mixed and placed in the sand blasting machine. A stream of this material is then forcibly blown against the work by means of a blast of air. The sand quickly cuts the surface of the metal and when this is done in the presence of my rust preventer (in this case monosodium phosphate) there is enough of the phosphates left on or adherent to the metal in the form of a dust or powder to protect the surface against the tendency to subsequently rust.

Potassium dichromate may be used in the same way and in about the same proportion as the monosodium phosphate, but its commercial use is not recommended due to its injurious physiological effects.

Iron and steel treated by my method are distinguished from the same metals treated with ordinary sand blasting by the slight darkness in appearance and freedom from the great tendency to rust. If hydrochloric acid or salt solution due to soldering and handling be present on the metals when they are sand blasted by the old methods, the steel soon rusts, and if these metals are painted before rusting, the work soon rusts under the paint, causing the paint to blister off. I have found, however, that when

metals contaminated with these rust causing chemicals are treated according to my method the rusting agencies are neutralized and the work may be painted without danger of its rusting under the paint.

The invention may also be used in connection with sand blasting with mud, in which case the chemicals which I have described may be mixed with the mud. The process is also adapted to sand blasting operations where steam is used instead of air in blowing the abrasives against the work.

It will be obvious to those skilled in the art that modifications may be made in details of procedure, and that the invention, in some of its aspects, being chemical includes a wide range of equivalents, hence I do not limit the invention otherwise than as the prior art and the appended claims may require.

I claim:

1. The method of etching metal which consist in sand blasting the metal in the presence of a rust preventing material.

2. The method of etching metal which consists in sand blasting the metal in the presence of a salt of phosphoric acid.

3. The method of etching metal which consists in sand blasting the metal in the presence of an acid salt of phosphoric acid.

4. The method of etching metal which consists in sand blasting the metal in the presence of a dry acid salt of phosphoric acid.

5. The method of etching metal which consists in sand blasting the metal in the presence of mono sodium phosphate.

6. The method of cleaning metal which consists in strongly blowing an abradant and a rust inhibitor against the suface of the metal, substantially as described.

7. An admixture for sand blasting consisting of an abrasive and an acid phosphate.

8. An admixture for sand blasting consisting of sand and an acid phosphate.

9. An admixture for sand blasting consisting of sand and mono sodium phosphate.

JAMES H. GRAVELL.