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METHOD OF CLEANING METAL AND MATERIAL THEREFOR

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1 Claim. (Cl. 51—278)

This invention appertains to the art of cleaning metals, metal surfaces, or the like.

A common method pursued today in cleaning metallic surfaces, especially used in foundries, forge shops, by welding companies, in enameling plants, and by car builders, and wherever metals are to be cleaned, comprises the projection and impingement against the metal surface to be operated on of some harsh, hard, sharp and durable abrasive substance. Usually this cleaning substance is applied by means of an air blast, in a manner well known to those versed in the art, and the action of the abrasive material, by reason of its hardness, is to cut into the surface of the metal in a manner that not only frequently mars said surface but results in a shattering of the abrasive substance itself in the use of the latter.

Common hard abrasive materials heretofore employed for the cleaning operation referred to include such materials as silica sand, graded steel shot, graded iron shot, graded crushed steel abrasives, carborundum, alundum, and like substances. The shot and crushed steel above mentioned are highly hardened.

The principle of the cleaning action involved in the employment of the above materials is to impinge or project against the surfaces operated upon a substance intentionally harder than the material which is to be cleaned.

With the foregoing in view, the primary object of the present invention has been to utilize, for the cleaning purposes stated, a material which is soft in its nature, by comparison with the materials usually employed at the present time such as those referred to herein. Such materials are commonly utilized for the cleaning of metal parts, as, for instance, welding skelp, castings, boiler plates, forgings, and all sorts of metal shapes which are required to be cleaned in the process of manufacture, or as a final preparation, for the sake of appearances, prior to shipment.

For the purposes of my invention, there is employed a material of relative softness of the following formula:—

	Per cent
Carbon	.125
Manganese	.37
Sulphur	.044
Phosphorus	.012
Silicon	.11
Iron (difference)	99.339

It is to be understood that the above formula is supplied as a technical one suitable for the purposes of my invention, but I do not wish necessarily to be limited to the exact substances indicated as existent in the formula, or to the exact proportions because the abrasive or cleaning material would be susceptible of some changes in the foregoing phases by reason of the nature and hardness of the particular metal which is to be acted upon by the same.

I have found in practice that a suitable soft metallic abrasive of substantially the above outlined formula is had in the use of clippings of relatively soft metal. Of course, the said clippings must approximate the formula stated, and they are segregated and are graded by a suitable screening means so that various uniform grades are produced. This grading operation is not necessarily of high importance so far as carrying out the invention may be concerned, but it is of importance bearing in mind that blasting equipment is designed to handle differently graded abrasive substances. Under these circumstances, I contemplate the grading of the clippings so that I may supply my abrasive material in given sizes that will be useful in conjunction with different kinds of blasting equipment, and the grading may be effected by any suitable process.

Moreover, the final finish that may be produced upon metallic surfaces depends somewhat upon the fineness of the abrasive material used so that the foregoing grading operation is essential for the production of commercial quantities of my abrasive material for ordinary usage.

From the foregoing it will be apparent that the abrasive material of my formula is of low carbon content and in the use of the abrasive I avail of the law well known in metallurgy that when soft low carbon steel is cold worked it somewhat increases in hardness. This theory of action is utilized in the carrying out of my invention because, by the impingement or projection of the relatively soft metallic abrasive previously described according to the general formula supplied, the practical effect of the contacting impact of the metal particles of the abrasive against the metallic surfaces to be cleaned has the effect of cold working the particles so that they are increased in their hardness by such action enabling them to successfully attack or create the desired abrasive action upon the surface of the metal resulting in the cleaning operation required and desired to be produced.

Further describing the action of my abrasive it may be said that the portion of each particle of the abrasive which directly strikes or contacts

with the metal surface to be cleaned, when projected against a surface by a blasting machine, is flattened and increased in size in reference to the area of contact or impact. This results in obtaining a smoother and more workman-like finish in respect to the surface cleaned, and moreover, avoids the scratching or marring of the surface which may, under some conditions, be an important thing to be avoided in reference to certain kinds of metal shapes that are being treated. Likewise, as stated before, as the portion of each particle of the cleaning substance that contacts with the surface to be cleaned impinges the surface and is flattened or spread by such action, it is correspondingly hardened through the operation of the principle of metallurgy previously indicated whereby the cold working of low carbon steel increases the hardness of the same. My abrasive does not cut away the surface of the metal cleaned as deeply as the harsher, hard abrasives commonly used, is more economical in use by reason of the saving of weight involved, and performs an additional function in reference to the cleaning action as regards the production of smudge. In this connection it may be said that in the use of ordinary abrasives a considerable amount of smudge or surface dust is developed in the cleaning operations employing the harder abrasives referred to in the opening portion of this specification, this smudge being disadvantageous because it is dirty and the dirt comes off in handling, unless it is removed by some additional cleaning process, not ordinarily employed.

In the use of my relatively soft abrasive, therefore, I have found that little or no smudge is developed, probably due to the fact that my abrasive does not cut deeply into the metal surface being cleaned as do the hard abrasives previously mentioned, and therefore, does not bring to the surface of the metal being cleaned the contained graphite which creates the heavy black deposit called smudge in commercial practise, of cleaning cast gray iron.

By the employment of my invention I have found it possible to obtain a material increase in the rate at which metal surfaces may be cleaned without, on the other hand, any off-setting decrease in the life of the cleaning material, affording a substantial advantage which will be self evident to those versed in the art.

As distinguished from the action of the ordinary hard abrasives that are usually shattered upon striking the metal to be cleaned, the particles of my relatively soft abrasive are deformed and actually hardened by the deforming impact. While the hardening action above referred to is slight, it nevertheless is condusive to maintaining the new shapes for the cleaning material created by the impact thereof with the hard metal surface that is being cleaned.

It is found in the practice of my invention that the sharp corners or points of the original material become flattened and rounded upon the first and subsequent runs of the material against the surface being cleaned. Because of this deforming and re-shaping of the metal particles of my cleaning material, I obtain an efficiency of the material increasing to a certain extent proportionate with the increased use thereof.

In view of the foregoing, it is evident that an essential and important characteristic of my cleaning material lies in its lack of brittleness as compared with the customarily used hard shattering materials. It is due to this particular characteristic that the deforming of the material increasing the superficial impact area is obtained. The non-shattering action of my material obviously prolongs its life of service, the material gradually wearing down as a result of continuous operations, but not being powdered or reduced through shattering effect that is incident to the employment of the relatively hard abrasive materials hereinbefore referred to.

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

A material for cleaning metal surfaces comprising metal particles of a formula substantially as follows:—

	Per cent
Carbon	.125
Manganese	.37
Sulphur	.044
Phosphorus	.012
Silicon	.11
Iron	99.339

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