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METHOD OF RECONDITIONING FERROTYPING SURFACES

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This invention relates to cleaning metal and alloy surfaces and more particularly to a method which may be employed to prepare a filmed chromium plated surface for replating with chromium.

It has long been known that metal surfaces in general tend to become soiled or filmed readily. The degree to which this filming occurs varies from metal to metal. The effect in general becomes more noticeable on buffed or polished surfaces and particularly on surfaces of corrosion resisting metals such as stainless steel, chromium platings, nickel, inconel and similar alloys and metals. These films in some instances are held loosely on the surfaces, in others are thought to be adsorbed and in most instances, when they result as a by-product of mechanical work such as in buffing or polishing, seem to be chemisorbed to the surfaces. These chemisorbed films are very hard to remove. Ordinarily organic solvents and the like, which do not dissolve the metal, are without effect on them. They may in some instances be removed by the use of strongly oxidizing acids, such as hot nitric, chromic and chromic-sulfuric acid mixtures. Obviously, such reagents which also dissolve the metal will remove the film simultaneously but they are undesirable for some applications.

Chromium surfaces in particular become filmed with undesirable adsorbed materials quite readily. Possibly this is more characteristic of chromium surfaces than it is of many other polished surfaces, and, therefore, a difficult problem is present in the replating of chromium and in obtaining water wetting of the chromium plated surface, and in any other instance when a "clean" chromium surface may be desired.

Heretofore, it has been customary in the replating of chromium surfaces to clean the surface by either severely etching the cromium surface; or by cathodizing it; that is, making the surface the cathode in an electrical circuit, at a current density below the deposit potential of chromium metal in the chromium-plating bath. The atomic hydrogen released during cathodizing at the chromium surface cleans the surface properly without interference with the deposition of adherent chromium over the chromium surface.

Neither the etching or cathodizing operations can be considered as being satisfactory for cleaning chromium surfaces such as film casting wheels, ferrotyping drums, ferrotyping plates, coating plates, forming and calendering rolls, plates for laboratory experimental use, or any other surface which might require a water break free or wettable chromium surface as a cyclic part of its commercial utilization. It is known that chromium surfaces may be made partly clean by polishing with dried Vienna-lime powder or Vienna-lime water slurry, lime-water slurry, pumice-water slurry, or a combination of these three materials in a water slurry form. The order and degree of cleanliness produced by all of these agents is imperfect and the amount of effort required is disappropriate to the end result obtained.

An object of the present invention is, therefore, an improved method of cleaning metal and alloy surfaces including chromium plated surfaces.

Another object of the invention is a method of suitably cleaning chromium plated surfaces so they may be replated with chromium.

Still another object of the invention is a method of reconditioning chromium plated ferrotyping surfaces, film base coating wheels and the like.

Other objects will appear hereinafter.

In accordance with the invention we have discovered that filmed metal surfaces, including chromium-plated surfaces, may rapidly and very efficiently be cleaned by employing a slurry of water and finely divided aluminum oxide powder which has an amorphous structure. In fact, the wettability produced on the chromium surfaces with this slurry was found to be durable and persistent for a considerable time after the surface had been dried. We have found that the optimum degree of wettability and "cleanliness" can be produced with a freshly prepared slurry of distilled water and the amorphous aluminum oxide powder applied by means of a soft, clean cloth or pad which must be reasonably free of starch or other surface-active materials. Commercial grades of amorphous aluminum-oxide powder, known in the trade as "buffing powders," work admirably in this process. We prefer to employ an amorphous unfused alumina powder available on the market as "B. P. A. 1 Fine." The abrasive action of the aluminum-oxide powder may be tempered by suspending the powder in water containing glycerine, ethyl alcohol, or the like. Excess slurry is removed from the surface before the plating operation.

Chromium ferrotyping surfaces can be "reconditioned" by first cleaning with a water slurry of the soft amorphous aluminum oxide, then applying a coating of a fatty acid such as stearic acid as a separate step. It is possible, however, to combine cleaning and film replacement by adding a small amount of a fatty acid soap to the amorphous aluminum-oxide slurry or powder or by adsorbing on the powder itself a very small amount of fatty acid and then making a water slurry out of the modified powder. The amorphous aluminum-oxide powder may also be suspended in organic solvents such as methylethyl ketone, trichloroethylene, and solvent naphtha with fair results. However, the most effective results with regard to the "cleaning" of chromium surfaces have been obtained using amorphous aluminum-oxide powder in a water slurry followed by subsequent coating of the surface with the organic film which is to be surface adsorbed.

The following examples further illustrate our invention:

Example 1

In the casting of continuous sheets of cellulose derivatives on chromium-plated wheels, there are times when insufficient surface "wetting" of the casting surfaces occurs with the result that thick round edges are formed on the cast sheet. This condition can be alleviated by sponging the edge zone with a slurry of water and amorphous oxide powder.

Example 2

Chromium and stainless steel surfaces which have been buffed with commercial compositions containing even small amounts of fatty acids must be "cleaned" of the resulting films by use of a slurry of water and amorphous aluminum oxide powder before such surfaces may be "coated" with pure films of substances such as silicones, organo-fluorine resins, gelatine, etc. if such secondary coatings are to adhere well and are to be essentially "pure" coatings.

Example 3

The wettability of silver application rolls can be in-

creased by treating with the above-described slurry in the manner described.

Example 4

In making local repairs on chromium surfaces utilizing a small cup or vessel containing an anode and designed to confine a small portion of chromium plating solution over and in contact with an area to be replated with chromium, cleaning and activation are very desirably effected by means of a water slurry of amorphous aluminum oxide.

Example 5

In my copending application Serial No. 238,776, filed July 26, 1951, entitled "Method of Forming Ferrotyping Surfaces," now Patent 2,678,908 of May 18, 1954, and concerning the controlled formation of cracked chromium plating surfaces, the cleaning and activating step after buffing of the first chromium plating is very desirably effected by using a water slurry with amorphous aluminum oxide powder in accordance with the present invention.

By cleaning metal surfaces with the water slurry of amorphous aluminum oxide powder, substantial improvements in preparing casting surfaces, which are so important in photographic film support production, can be made. These improvements are quite unexpected and enable superior products to be made on surfaces so treated. In the following claims the term "film" refers to undesirable surface conditions such as caused by materials being adsorbed in the metal surface of the casting wheel or the like.

What we claim and desire to secure by Letters Patent of the United States is:

1. The method of reconditioning a chromium plated ferrotyping surface which comprises cleaning the surface by hand rubbing with an aqueous slurry of finely divided amorphous aluminum oxide until the surface film is removed, removing the slurry from the surface, and applying a coating of a fatty acid thereto.

2. The method of claim 1 wherein the fatty acid is incorporated in the amorphous aluminum oxide water slurry.

References Cited in the file of this patent

UNITED STATES PATENTS

2,678,908 Tucker ---------- May 18, 1954

OTHER REFERENCES

Eldrige: "Metal Industry," vol. 26, No. 6 (June 1928), pages 258–9.