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UNITED STATES PATENT OFFICE

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ELECTROPLATING

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It is a well-known practice to add certain organic compounds to electroplating baths to produce smooth, bright deposits. Protein materials, sulfite cellulose waste, alkaline extracts or solutions of wool, albumen, etc., have been used or suggested as so-called "addition agents" to a considerable extent.

I have now found that sulfonated vegetable oils when added to electroplating baths produce very desirable and unique results. This is particularly the case with alkaline cadmium-cyanide baths, and if such cadmium baths contain small amounts of nickel salts as described in my co-pending application Serial No. 150,376, Patent 1,681,509, Aug. 21, 1928, filed November 23, 1926, I have found that the addition of sulfonated oils produces platings which are smoother, denser, and brighter than any other cadmium plates so far known.

The most common available sulfonated oil useful in my invention is the Turkey red oil, or sulfonated castor oil which is used in tremendous quantities in the textile industries. Other sulfonated oils, such as sulfonated cotton seed oil, sulfonated corn oil, etc., were found to have equally as good brightening effect.

Sulfonated castor oil is quite often used in admixture with water insoluble solvents such as carbontetrachloride, hydronapthalenes, hydrocresoles, etc., such mixtures being soluble in water and are used as detergents and washing agents. Such mixtures can likewise be used as addition agents, though in most cases they will have no additional separate advantage over straight sulfonated castor oil when added to an electroplating bath.

The amounts of sulfonated vegetable oil to be added to an electroplating bath can be varied to a considerable extent. I have found, for instance, that in a cadmium cyanide bath containing the requisite other electrolytic salts, 0.5% to 3 or 4% of the bath of Turkey red oil will give remarkable results; amounts above 1% are not detrimental but give no better results than smaller amounts.

The sulfonated oil is usually introduced directly into the electroplating bath.

The following is an example of a very effective cadmium plating bath:

Sodium cyanide 120 grams, cadmium hydroxide 48 grams, sodium sulfate 60 grams, cryst. nickel sulfate 1.5 grams, turkon oil 12 grams, (this is a commercial grade of sulfonated castor oil,) are dissolved to one liter with distilled water. Using a cadmium anode this bath allows of a current density of over 20 amperes per square foot. When plated on a polished iron surface, the deposited cadmium coating has a mirror-like surface and does not require any polishing when used as a finish plate or as an undercoat for a nickel plate. The cadmium coat obtained from the above bath is also bright, dense, and white when deposited on any surface.

It is often advisable in the commercial application of electroplating to provide the manufacturer with a ready prepared dry mixture of the electroplating salts, from which he can prepare his baths by merely dissolving such a compounded mixture in water.

Sulfonated vegetable oils can easily be incorporated into such ready-prepared mixtures.

Monopole soap, for instance, is a solid form of sulfonated castor oil and can be added while the other components are being mixed. The liquid sulfonated vegetable oils are easily absorbed on the constituents of the plating compound mixture, and the product obtained is practically dry. It is also possible to prepare cadmium salts or compounds of the sulfonated oils. This can be achieved, for instance, by adding a cadmium salt, such as the sulfate, to a solution of a sulfonated oil in caustic soda. The cadmium compound of the sulfonated oil separates and can be recovered. This is, in the case of sulfonated castor oil, a white solid which mixes readily with the other electroplating components.

The composition of such compounded electroplating salts can be varied within wide limits, but it will be found that the presence therein of a sulfonated vegetable oil, particularly in connection with cadmium plating

salts containing small amounts of nickel salts, produces plating baths from which exceptionally bright, dense deposits are obtained.

The following is a typical example of such compounded electrolyte which was found particularly valuable:

Sodium cyanide_____	120	parts by weight
Cadmium hydroxide_	48	" " "
Sodium sulfate_____	60	" " "
Cryst. nickel sulfate_	1.5	" " "
Sulfonated castor oil_	12	" " "

It is a dry powder, easily soluble in water.

I claim:

1. A cadmium-cyanide electroplating bath containing a sulfonated vegetable oil in addition to the requisite cadmium, cyanide, and other electroplating compounds.

2. A cadmium-cyanide electroplating bath containing sulfonated castor oil and a small amount of a nickel salt in addition to the requisite cadmium, cyanide, and other electroplating compounds.

3. A composition of matter adapted for use in the preparation of an electroplating bath consisting of a substantially dry mixture comprising a cadmium compound, and a sulfonated vegetable oil.

4. A composition of matter adapted for use in the preparation of an electroplating bath consisting of a substantially dry mixture comprising a cadmium compound, a small amount of a nickel salt, an alkali metal cyanide and sulfonated castor oil.

5. A composition of matter adapted for use in the preparation of an electroplating bath consisting of a mixture of 48 parts cadmium hydroxide, 120 parts sodium cyanide, 60 parts sodium sulfate, 1.5 parts crystallized nickel sulfate, and 12 parts Turkon oil.

6. Process which comprises electrodepositing cadmium from a cadmium-cyanide electroplating bath containing a sulfonated vegetable oil in addition to the requisite cadmium, cyanide, and other electroplating compounds.

In testimony whereof, I affix my signature.

LEON R. WESTBROOK.