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IMPACT MEDIA FOR MECHANICAL PLATING AND METHOD OF USING SAME

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FIG. 1

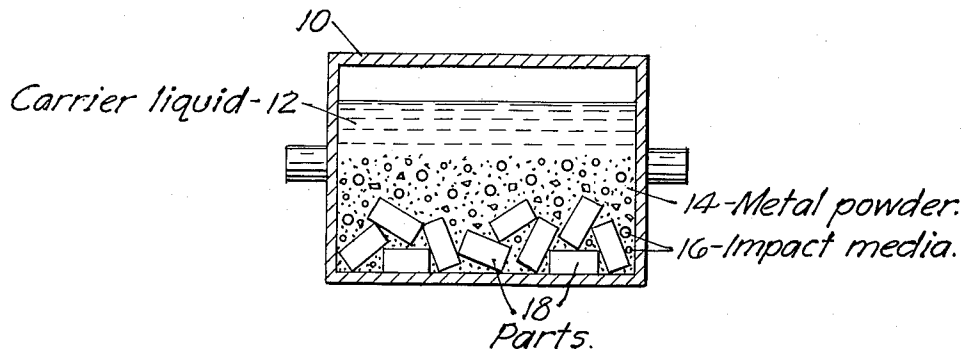


FIG. 2

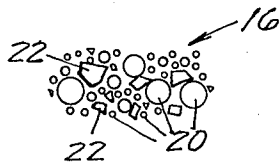


FIG. 3



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IMPACT MEDIA FOR MECHANICAL PLATING AND METHOD OF USING SAME

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This invention relates to mechanical plating and more particularly relates to an improved impact media for mechanical plating.

Mechanical plating, as used herein, is the plating, coating or cladding of articles, usually metal articles, by impacting powdered metal particles onto the surface of such articles in such a manner as to transform the metal powder into a continuous protective and/or decorative plating on the article surface. The thickness of the plating may be varied within reasonably controllable limits by the amount of plating powder in the system, the time of impacting, and the rate of impacting, along with other factors.

Ordinarily, in mechanical plating, the articles or parts to be plated are placed in a tumbling barrel or drum and the metal powder, impacting media and such other additives, usually water and so-called promoter chemicals, e.g. such as those of Reissue Patent Re. 23,861, to facilitate the plating action, are added to the barrel and the barrel tumbled. With this tumbling action, the impacting media hammer the plating powder into a continuous plating on the articles to be plated. In this regard, although the articles themselves serve to some degree to impact the powdered metal into place in the plating formation, the impacting media with which this invention is concerned are those added in addition to the articles to be plated. The metal powder, the articles to be plated, the promoter chemicals and the impacting media are usually a liquid slurry, although some mechanical plating operations are carried out in a dry system.

Even the best mechanically plated articles heretofore have displayed a rather rough, orange-peel appearance, which appearance is believed to have been a significant factor limiting the growth of the mechanical plating industry. Further, plating thicknesses, while being subject to a considerable degree of control in mechanical plating operations, are difficult to control on screw thread walls, and plating continuity is sometimes poor in thread roots and on other geometrically intricate surfaces. Thus, objections to mechanical plating of such hardware items as flat washers, hinges, screws, nuts, and the myriad of items stamped from sheet stock which can be handled in tumbling barrels were oftentimes made, even though mechanical plating would be otherwise a preferred plating system.

I have discovered that platings of greatly improved surface luster and smoothness can be obtained and that the coating uniformity of geometrically intricate surfaces is greatly improved when a mixture of spheroidal (including spherical) and non-spheroidal vitreous particles are used as an impacting media in mechanical plating operations.

Thus, it is an object of this invention to provide impact media for mechanical plating which enables the production of mechanically plated articles with greatly improved surface luster or sheen. Another object is to provide mechanical plating impact media which produce more uniform platings than heretofore feasible on mechanically plated articles possessing relatively intricate surface geometry. Another object is to provide a method for producing mechanically plated articles of improved sheen and in the case of geometrically intricate surfaced parts more uniform coatings, through variations of the

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impact media. Other objects and advantages of the invention will appear as the description proceeds.

While mixtures of spheroidal particles with non-spheroidal particles such as combinations of glass beads with aluminum oxide particles and sand with metal shot and the like have in the past been used in mechanical plating, such combinations have been found inferior to mixtures of graded sizes of spheroidal vitreous particles, primarily glass beads, in the formation of mechanically plated articles. Consequently, graded sizes of spheroidal beads of glass were the generally preferred impact media prior to the present invention since such media appeared to provide the platings with the better luster and more uniform coating thicknesses.

In accordance with the present invention, however, it has been found that when a mixture of spheroidal and non-spheroidal vitreous particles, wherein the non-spheroidal particles have the edges and other impacting surfaces thereof free from apparent abrasive roughness, is used as the impacting media, mechanically plated articles having visibly superior luster and better plating continuity, particularly with articles of intricate surface geometry such as screw threaded parts, are obtained. Non-spheroidal vitreous particles of randomly irregular shapes with numerous platoidal surfaces or major platoidal surface areas and polygonal in cross-section with the edge, corner, platoidal and other exposed surface areas smooth to the touch have been found to be highly useful in the practice of the invention. A preferred class of non-spheroidal vitreous particles in the practice of the invention is polished, randomly irregular cullet of shapes predominantly polygonal in cross section and being of a size range of from about 0.03 inch to about 0.75 inch.

In the accompanying drawing a tumbling barrel loaded for mechanical plating is illustrated in simplified form in cross section in FIGURE 1; a sample distribution of an impact media mixture formulated in accordance with this invention is illustrated in FIGURE 2; and, FIGURE 3 illustrates some typical non-spheroidal shaped impact media.

Referring to the accompanying drawing in somewhat more detail, the interior of a tumbling barrel 10 is revealed loaded for beginning a tumbling operation to plate metal powder onto the surface of articles to be so plated. To facilitate illustration, the barrel is displayed as containing a carrier liquid 12 (having promoter chemicals dissolved therein to facilitate the plating action of the metal powder) with a metal powder 14 to be plated, and an impact media 16 to aid in plating. The parts to be plated are designated by the numeral 18, and may be of any desired shape. The powder 14 and impact media 16 in the carrier liquid are shown in suspension, rather than settled in the bottom of the drum as they would be with the drum at rest, for simplicity of illustration. It is to be understood that these ingredients would probably be mixed in more random fashion within the tumbling barrel than is illustrated and no attempt has been made to draw the ingredients to scale.

In FIGURE 2, a sampling of the impact media 16 is shown in somewhat enlarged scale whereby the graded sizes of spherical impacting particles 20 can be shown intermingled with graded sizes of nonspherical particles 22. In FIGURE 3, some typical possible shapes of the nonspherical polished glass cullet 22 are disclosed; however, it is to be understood that these particle shapes are illustrative only and not all-inclusive of the almost infinite variety of nonspherical shapes possible.

Non-spheroidal particles having a major dimension larger than about $\frac{3}{4}$ of an inch (the longest dimension of the particle is measured by passage through a square mesh screen or by simply measuring the longest dimension with a ruler or scale) have been found to be generally ineffec-

tive to provide the improved results of this invention as there is a tendency for the powdered metal of the plating operation to plate out on these particles whereby they detract from the plating efficiency of the system and consequently, as an economic matter, while a little of this may be tolerable, the net result is to change particles of such large sizes from impact media to coated parts.

When the non-spheroidal vitreous particle size falls below about 0.03 inch, the abrasive action of the particles is too great on the plated parts and the luster, in fact even the coating continuity, become detrimentally effected. Here again, however, minor amounts of non-spheroidal particles smaller than about 0.03 inch can be tolerated to some degree without serious detrimental effect on the system.

The percentage of non-spheroidal particles to total impact media mixture of spheroidal and non-spheroidal particles in parts by volume may be varied from about 5 to about 80% to provide mechanically plated parts with visibly superior lusters, and in the case of screw threaded and other parts having intricate surface geometry, more uniform coating thicknesses and continuity, and in the case of threaded parts, greater thread root coverage.

In the selection of spheroidal particles in the impact media mixture, those having a size range of from about 0.006 inch to about 0.35 inch have been found suitable. For convenience, the spheroidal particles may be divided basically into groups of "fines," which are those spheroidal particles from about 0.006 inch to about 0.014 inch, intermediate fines from 0.014 inch to about 0.035 inch, and "large," namely those of a size larger than about 0.035 inch. It is only in the case of very intricate surface geometry, e.g., small screw threaded parts, etc., that large quantities of the fines (up to 30% by volume of the impact media mixture) are used as on flat parts they may contribute to roughness of plated surfaces.

The large spheroidal particles are limited in their gross size primarily because of the tendency of the powdered metal in the mechanical plating mixture to plate out onto them as well as on the parts it is actually desired to plate and further because when such particles are used, as for example on parts made of metal stampings with sharply angled sections, a "halo" effect is sometimes apparent wherein the area of the part immediately at the juncture of the sides to the angle (inside) is relatively dull as compared with the flatter surfaces on both sides thereof. However, oftentimes larger spheroidal particles may be added to the plating system to space parts from one another and prevent them from unduly scratching one another, as for example to separate from one another loud speaker frames which tend to nest with one another and radio chassis with sharp corners.

The selection of any particular combination of sizes of spheroidal and non-spheroidal particles in any given impact media mixture is of course somewhat dependent on the type, size, and shape of the part to be plated. The usual parts to be plated are of ferrous metals, in many instances overcoated with flash immersion coatings of copper or the like to promote plating adherence, and are predominantly hardware items such as nuts, bolts, screws of all sizes, serrated washers and similar items having relatively intricate surface geometry as well as parts stamped and formed from flat sheet stock, and including flat washers, hinges, rods, bars, small plates, and various stamped frames such as brackets, holders, and similar items.

While plating can be formed of almost any powdered metal or powdered metal alloy of a particle size about 44 microns and smaller, which will adhere to the article being plated, zinc, cadmium and tin are the more common plating powders as well as alloys of zinc, cadmium and tin among themselves and with other metals. As exemplary of other metal powders which may be utilized, brass, bronze, silver and gold may be considered.

Selection of the size ranges of the spheroidal and non-

spheroidal particles comprising the impact media mixture to be used in the mechanical plating of articles will vary with the article to be plated for optimum results. Thus, with relatively flat parts as for example small leaf springs, washers, hinge plates and the like, impact media mixtures may contain only the larger spheroidal particles and little or no spheroidal particle fines, and only the larger, non-spheroidal particles of from about 0.2 to about 0.75 inch.

On the other hand, with small parts having very intricate surface geometry such as that found in small screws, nuts, etc., a significant percentage of spheroidal "fines" of the smaller sizes, from about 0.006 to about 0.014 inch will be present as a percentage of the spheroidal particles in the mixture and the non-spheroidal particles present will probably not exceed a size over about $\frac{1}{10}$ of an inch, the non-spheroidal size range possibly being from 0.03 to about 0.09 inch.

Between the two extremes noted in the preceding paragraphs are obviously many size range and percentage range combinations of the spheroidal and non-spheroidal particles which may be found to be optimum for any particular type of part being coated or plated.

With respect to simple flat parts such as washers, hinge plates, etc., preferred impact media mixtures are those containing from about 50 to about 70% non-spheroidal particles as a volume percentage of the total mixture of spheroidal and non-spheroidal particles. With respect to parts having intricate surface geometry such as the screws and the like noted in the preceding paragraph, mixtures containing from about 15 to about 70% non-spheroidal particles have been found to provide plated articles having visibly improved surface finishes, e.g., better luster, and more uniform coating thicknesses; preferred mixtures for such parts have been found to be those containing from about 30 to about 60 volume percent non-spheroidal particles.

While from the foregoing description the invention will be apparent, the examples following are offered herewith to illustrate the practice of the invention. It is to be understood these examples are illustrative only and that the invention is not limited thereto.

The examples following may be divided basically into two groups, the first group compares the platings of parts plated with spheroidal and non-spheroidal vitreous particle impact media mixtures with identical parts plated with completely spheroidal impact media mixtures, the parts having relatively intricate surface geometry; and, the second group of examples compares parts plated with mixtures of spheroidal particles as impact media with parts plated with mixtures of spheroidal and non-spheroidal particles as impact media, the parts being flat with no involved surface considerations. In each group of examples the only variable to be found is the impact media formulations, although the total volume of impact media was in all cases about 2½ quarts.

In the first group of examples, Examples 1-5, a 4500 cubic centimeter capacity hexagonal tumbling mill having 9 inch diameter barrel which revolves at 54 r.p.m.'s was used. Into the barrel was placed a charge containing 1500 grams of copper immersion coated No. 10 screws $\frac{3}{8}$ inch long containing 24 threads to the inch, with hexagonal shanks and round flat heads, to be plated. The charge to the barrel also included 19 grams of zinc powder, or dust, 10 grams of a promoter chemical and sufficient water to immerse the settled charge and cover the charge to a depth of about 1 inch, the water temperature being between about 50 and 70° F. The tumbling time in the barrel in all cases was 60 minutes and the spheroidal particles were glass beads and the non-spheroidal particles polished glass cullet.

Example 1

In this example the recommended commercial formulation of spheroidal glass beads as impact media for such parts was used and comprised the following mixture.

Bead size:	Volume percentage
.13-.18 inch.....	57.1
.055-.066 inch.....	28.6
.006-.033 inch.....	14.3

Examination of the screws from this run revealed that in appearance the plated parts displayed a luster and a coating coverage of the parts comparable to the best obtainable using prior art plating methods and impact media; however, the threads when viewed under a microscope displayed a considerable area of discontinuous coverage at the thread roots and an undesirable "mound-type" build up on the thread sidewalls indicating that powdered metal plated out in the thread sidewalls in excess at the expense of coverage of other parts of the screws.

Example 2

Impact media mixture in this example was as follows.

Bead size:	Volume percentage
.13-.18 inch.....	57.1
.055-.066 inch.....	23.6
.006-.033 inch.....	14.3
Non-spherical cullet: .03-.05 inch.....	5.0

The luster of the screws, as observed from the heads and shanks, was slightly higher than that of the first example. In other aspects the screws appeared about the same as those of Example 1 with possibly somewhat better thread coverage in this example than in the preceding one.

Example 3

In this run the impacting media charge contained 57.1% glass beads in a size range of .13-.18 inch in diameter, about 14.3% of glass beads of .006-.033 inch diameter and about 28.6% non-spheroidal glass cullet of .03-.05 inch long dimension.

The luster of these parts was very high and the surface smoothness visibly better than the previous examples. The thread coverage, as observed under about 45X magnification displayed much better continuity in the thread roots than either of the previous examples.

Example 4

The impact media formulation of this example comprised about 50% glass cullet of a size range of from .03-.05 inch as the non-spheroidal component of the mixture, 40% glass beads of .13-.18 inch diameter and 10% .006-.033 inch diameter glass beads. Luster of the parts appeared to be as good as, and possibly slightly better than, the luster of the parts of Example 3; thread coverage likewise appeared to be excellent. However, the coating efficiency, namely the amount of powder in the charge coated out onto the parts, while still quite high (about 90%) was not quite as good in this run as in the preceding runs.

Example 5

In this example 75% of the impact media mixture was non-spheroidal glass cullet of a size of .03-.05 inch, 20% of the mixture was spherical glass beads of .13-.18 inch diameter and the remaining 5% was glass beads of .006-.033 inch diameter. In all respects these parts were deficient in that the thread coverage was poor, the luster was even less than that of Example 1 and the coating efficiency was poor.

Other runs where only the non-spherical particles, namely the .03-.05 inch glass cullet particles were used as impact media displayed similar results to those of Example 5 with the small threaded parts.

The foregoing and other runs indicate that for small screws and the like, the non-spherical particles should preferably comprise about 20-60% of the mixture, and that the amount of spheroidal fines present should be preferably about 10 to 20% of the mixture to achieve the advantages of maximum coverage and luster.

In the examples which follow the same tumbling mill

described hereinbefore was used and the charge distinguished over the charge of the first series of examples to the extent that only 18 grams of zinc dust were used and the parts to be plated were 10 flat springs bent to horseshoe shape about 6 inches long, which springs had no recesses and were stamped out of flat sheet stock. They had been previously subjected to a light coating of copper by immersion. The tumbling time again was 60 minutes, and the total spring weight about 600 grams.

Example 6

In this example the commercially recommended glass bead impact media mixture of Minnesota Mining and Manufacturing Company was used. The mixture is as follows.

Bead size:	Volume percentage
.13-.18 inch.....	57.1
.055-.066 inch.....	28.6
.014-.033 inch.....	14.3

The resulting plated parts displayed the characteristically low luster of good quality commercially acceptable mechanically plated flat parts.

Example 7

In this example the impact media consisted of 95% graded spherical glass beads and 5% non-spherical glass cullet, the cullet size was about .19-.25 inch and the bead size, as a percentage of the total mixture, were as follows.

Bead size:	Volume percent (approx.)
.13-.18 inch.....	57
.014-.033 inch.....	15
.055-.066 inch.....	23

Inspection of the parts revealed that the surfaces were slightly smoother than those of Example 6 and possessed a visibly better luster. Coating efficiency was about the same as that of the preceding example.

Example 8

Impact media mixture of this example is as follows.

Bead size:	Percentage
.055-.066 inch.....	55
.014-.033 inch.....	15
Cullet size: .19-.25 inch.....	30

The resulting products exhibited a much smoother plating than the parts of Example 6 or 7 with a correspondingly better luster than either of the preceding two examples, and with about the same coating efficiency.

Example 9

The impact media mixture of this example was as follows.

Bead size:	Volume percentage
.055-.066 inch.....	28
.014-.033 inch.....	15
Cullet size: .19-.25 inch.....	57

The parts exhibited extremely smooth surfaces for mechanical plating with good high luster; the coating efficiency remained about the same as the preceding examples.

Example 10

The impact media mixture of this example was as follows.

Bead size:	Volume percentage
.055-.066 inch.....	30
Cullet size: .19-.25 inch.....	70

The resulting parts exhibited extremely smooth surfaces and luster comparable to that normally associated with electroplated parts. Coating efficiency was comparable with but not quite as good as that of the preceding examples.

Example 11

In this example the impact media mixture contained

90% by volume cullet of the .19-.25 inch size with 5% each of glass beads having the respective size ranges of .055-.066 inch and .014-.033 inch.

The resulting products although having an extremely smooth surface with excellent luster coated to such a thin plating as to be almost discontinuous exhibiting extremely poor coating efficiency.

In other runs wherein 100% cullet was used, discontinuous surface platings resulted and it appears that about 80% by volume non-spheroidal particles is about the tolerable maximum to attain smooth surfaces with high luster without obtaining these properties at the expense of desirable coating thicknesses.

The impact media of this invention enable carrying out mechanical plating operations with a maximum of efficiency and with a heretofore unattainable degree of quality as indicated by luster, smoothness, and continuity of coverage in the resulting plate. Further, the plating thickness tends to be more continuous and complete at previously resistant geometric points such as screw thread roots and the like than has heretofore been possible.

While not wishing to be bound by any theory as to the significantly improved results obtained by combining spheroidal and non-spheroidal particles as the impact media mixture, it is believed that the non-spheroidal particles, with the angularity provided by numerous corners and edges combined with large, relatively smooth planar surface areas, enable excellent deformation of the metal powder particles, the rounded edges and corners of the non-spheroidal particles initially deforming the metal powder and the flat or nearly flat surfaces of these particles sliding over the surfaces being plated without tumbling to plane and burnish these surfaces to a smoothness and high luster heretofore unattainable in mechanical plating. When all non-spheroidal particles are utilized, however, it appears there is insufficient free sliding movement of the impact media as a mass to enable consistent impacting action at all areas of the parts to be plated; consequently, the incorporation of the spheroidal particles in the media appears to be a necessary ingredient in the mixture.

Vitreous particles are desired because of their dense, non-porous surfaces which provide good impacting action without undue abrasion and in addition provide surfaces to which the metal powder to be impacted does not adhere preferentially to the parts being plated. Consequently, glass and porcelain are the preferred vitreous particles. Other equivalent materials can also be used.

From the foregoing description it is believed the invention and the practice thereof will be apparent to those skilled in the art. Since minor modifications and changes in the impact media mixture not specifically described hereinbefore will obviously be occasioned in the practice of the invention, it is to be understood that the invention is to be limited only to the extent required by the appended claims.

What is claimed is as follows:

1. Mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal vitreous particles, said non-spheroidal particles comprising from about 5% to about 80% by volume of the mixture and being of a size range from about 0.03 inch to about 0.75 inch, said non-spheroidal particles having the edges and other surfaces thereof smooth to the touch, and having a major platoidal surface area.

2. Mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising from about 5% to about 80% by volume of the mixture, said non-spheroidal particles having the edges and other impacting surfaces thereof free from apparent abrasive roughness, having a major platoidal surface area and being generally polygonal cross-section, said non-spheroidal particles being of a size range of from about 0.03 inch to about 0.75 inch.

3. Mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising from about 5% to about 80% by volume of the mixture, said non-spheroidal particles being polished, randomly irregular cullet of predominantly polygonal cross-sectional shapes and being of a size range from about 0.03 inch to about 0.75 inch.

4. In the mechanical plating of metal plating powders onto articles having intricate geometrical surface areas to be plated such as screws and nuts, a mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising about 15% to about 70% by volume of the mixture and being of a size range of from about 0.03 to about 0.1 inch, said non-spheroidal particles being generally of polygonal configuration, and having the edges and surfaces thereof smooth to the touch and free of apparent abrasive roughness.

5. The mechanical plating of claim 4 wherein said non-spheroidal particles comprise about 30-60% by volume of the mixture.

6. In the mechanical plating of metal plating powders onto articles having relatively smooth unbroken surfaces to be plated such as metal stampings, a mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said mixture containing from about 5 to about 80% non-spherical particles by total volume of spheroidal and non-spheroidal particles, the size of said non-spheroidal particles being in the range of from about 0.20 inch to about 0.75 inch, said non-spheroidal particles possessing major platoidal surface areas and being generally of polygonal cross-section and of random shapes with the surfaces thereof smooth to the touch and free of apparent abrasive roughness.

7. A method for providing mechanically plated articles having improved luster which comprises mechanically plating said articles with a metal plating powder in the presence of an impacting media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising from about 5 to about 80% by volume of the mixture and being of a size range from about 0.03 inch to about 0.75 inch, said non-spheroidal particles having the edges and surfaces thereof smooth to the touch and being of irregular, random shapes.

8. A method for providing mechanically plated articles having improved luster which comprises mechanically plating said articles with a metal plating powder in the presence of an impacting media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising from about 5 to about 80% by volume of the mixture and having edges and non-porous irregular impacting surfaces free from apparent abrasive roughness, said non-spheroidal particles being of randomly irregular, predominantly polygonal shapes in cross section and being of a size range of from about 0.03 inch to about 0.75 inch.

9. A method for providing mechanically plated articles having improved luster which comprises mechanically plating said articles with a metal plating powder in the presence of an impacting media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising from about 5 to about 80% by volume of the mixture and being polished, randomly irregular cullet of predominantly polygonal cross sectional shape in a size range of from about 0.03 inch to about 0.75 inch.

10. A method for providing mechanically plated articles having improved luster which comprises mechanically plating said articles with a metal plating powder in the presence of an impacting media comprising a mixture of spheroidal and non-spheroidal shaped vitreous

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particles, said non-spheroidal particles comprising from about 5 to about 80% by volume of the mixture and being polished, randomly irregular cullet of predominantly polygonal cross-sectional shape in a size range of from about 0.03 inch to about 0.75 inch, said spheroidal particles being essentially within a size range of from about 0.006 inch to about 0.35 inch.

11. Mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal vitreous particles, said non-spheroidal particles comprising from about 5% to about 80% by volume of the mixture, said non-spheroidal particles having the edges and surfaces thereof generally smooth to the touch and being generally polygonal in cross-section, said non-spheroidal particles being essentially within a size range of from about 0.03 inch to about 0.75 inch, said spheroidal particles being essentially within a size range of from about 0.006 inch to about 0.35 inch.

12. In the mechanical plating of metal plating powders onto articles having intricate geometrical surface areas to be plated such as screws and nuts, a mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said non-spheroidal particles comprising about 15% to about 70% by volume of the mixture and being of a size range of from about 0.03 to about 0.1 inch, said non-spherical particles being generally of polygonal configuration, and having the edges and surfaces thereof smooth to the touch and free of apparent abrasive roughness, said spheroidal particles being within a size range of from about 0.006 inch to about 0.35 inch.

13. The combination of claim 12 wherein said non-spherical particles are of polished glass cullet, and comprise about 30-60% by volume of the mixture.

14. In the mechanical plating of metal plating powders

onto articles having relatively smooth unbroken surfaces to be plated such as metal stampings, a mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal shaped vitreous particles, said mixture containing from about 5 to about 80% non-spherical particles by total volume of spheroidal and non-spheroidal particles, the size of said non-spheroidal particles being in the range of from about 0.25 inch to about 0.75 inch, said non-spheroidal particles being generally of polygonal configuration and having the edges and surfaces thereof smooth to the touch and free of apparent abrasive roughness, said spheroidal particles comprising from about 30%-100% by volume particles of a size from about 0.035 inch to about 0.35 inch, any remaining spheroidal particles being in a size range of from about 0.014 to about 0.035 inch.

15. Mechanical plating impact media comprising a mixture of spheroidal and non-spheroidal vitreous particles, said non-spheroidal particles comprising from about 5% to about 80% by volume of the mixture and being of a size range from about 0.03 inch to about 0.75 inch, said non-spheroidal particles having the edges and other surfaces thereof smooth to the touch, and having a major platoidal surface area, said spheroidal particles having a size range of from about 0.006 to about 0.35 inch.

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