April 14, 1964 R. D. SCHAD 3,128,488

PLASTIC BRUSH

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FIG. 1

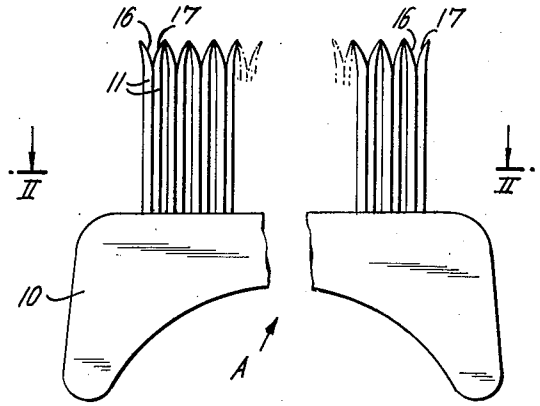


FIG. 2

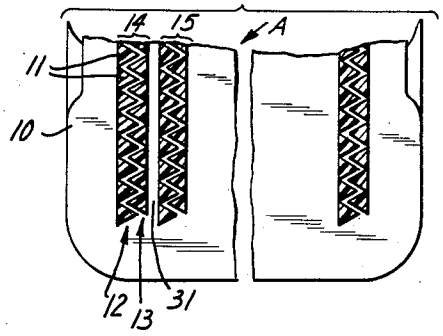


FIG. 3

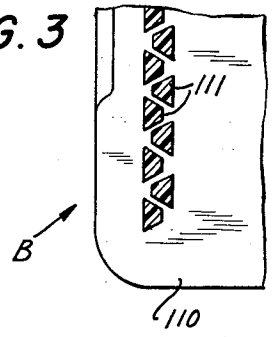
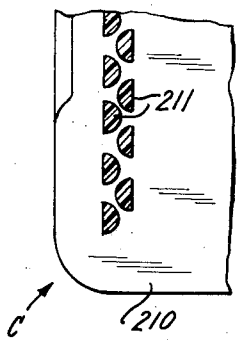


FIG. 4



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FIG. 5

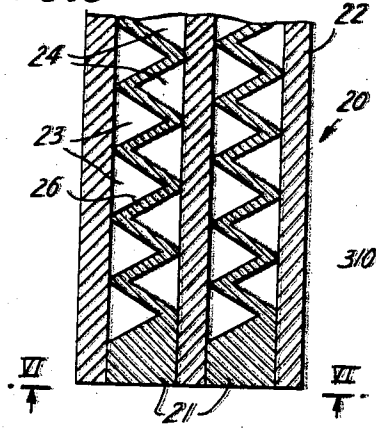
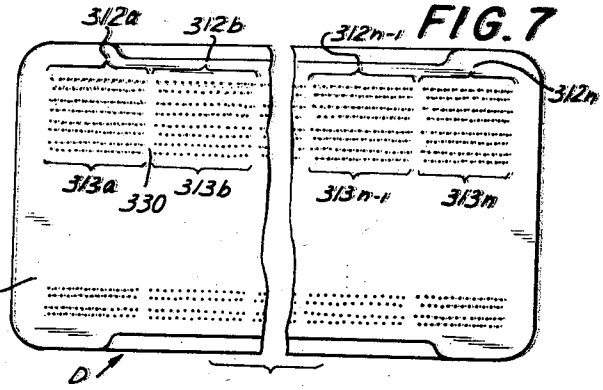


FIG. 7



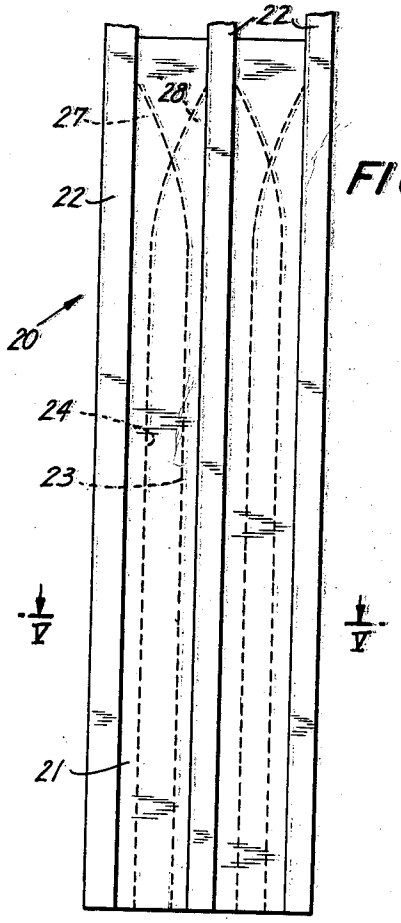


FIG. 6

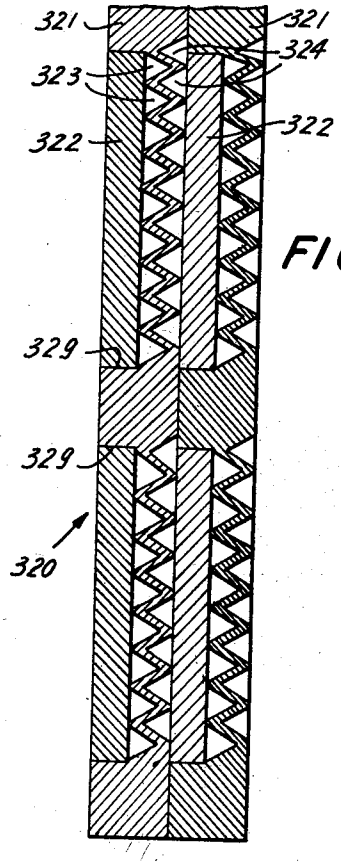


FIG. 8

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3,128,488

PLASTIC BRUSH

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Filed Aug. 24, 1961, Ser. No. 133,737
5 Claims. (Cl. 15—187)

The present invention relates to molded synthetic plastic articles, and more particularly to a plastic brush whose backing element is integral with the bristles. This is a continuation-in-part of my copending application Serial No. 708,952 for "Method and Apparatus for Forming Brushes," now Pat. No. 3,004,291.

An important object of the invention is to provide a plastic brush whose backing element may accommodate an exceptionally large number of bristles per unit area.

Another object of the invention is to provide a plastic brush of the above outlined characteristics wherein the bristles are arranged in such a way that, even though they are very close to each other, any foreign particles may be conveniently and rapidly expelled from the spaces between the bristles.

A further object of the invention is to provide a brush of the just outlined characteristics wherein the spacing between the bristles is selected with a view that, in addition to facilitating expulsion of entrapped impurities, it contributes to the eye-pleasing appearance and to the sales appeal of the product.

Still another object of the instant invention is to provide a brush of the above described type whose brushing or cleaning action is superior to the brushing action of plastic brushes of which I am aware at this time, and whose brushing action remains unchanged regardless of the direction in which the user moves the bristles along a surface that requires treatment.

A concomitant object of the invention is to provide a brush which may be mass manufactured at a low cost, and whose bristles in their entirety form a structure which prevents excessive deformation of individual brushes though the brushes may consist of a readily deformable resilient synthetic plastic material.

With the above objects in view, the invention resides in the provision of a plastic brush comprising a backing element having a bristle-supporting side and a plurality of bristles which are integral with and project from the side of the backing element. The bristles are arranged in a plurality of pairwise disposed rows each of which comprises a plurality of preferably closely adjacent bristles, and the bristles of each row define between themselves spaces so that the rows of bristles in each pair of rows may be disposed in such close proximity of each other that the spaces defined by the bristles in one row at least partially receive the bristles in the other row of the respective pair of rows.

Certain other features of the invention reside in the provision of specially configurated bristles, in the provision of bristles whose tips are inclined with respect to the tips of bristles in the adjacent row or rows, in the provision of a brush having bristles disposed in staggered rows whose sections define gaps for convenient evacuation of impurities, in the provision of a special bristle mold, and in the provision of a brush whose pairwise arranged bristle rows are so close to each other that the spacing between the adjacent pairs of rows may be even less than the maximum transverse dimension of a bristle. The brush may be made of polyethylene or any other suitable synthetic plastic substance.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together

with additional objects and advantages thereof, will be best understood from the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a fragmentary and elevational view of a brush embodying one form of the invention;

FIG. 2 is an enlarged fragmentary section as seen in the direction of arrows from the line II—II of FIG. 1;

FIG. 3 is a similar fragmentary section through a modified brush which comprises bristles of substantially trapezoidal cross sectional contour;

FIG. 4 is a further fragmentary section through a different brush with bristles of substantially semicircular cross section;

FIG. 5 is a fragmentary section through a bristle mold which is utilized in the manufacture of brushes of the type shown in FIGS. 1 and 2, the section of FIG. 5 being taken in the direction of arrows from the line V—V of FIG. 6;

FIG. 6 is an end elevational view of the mold as seen in the direction of arrows from the line VI—VI of FIG. 5;

FIG. 7 is a schematic top plan view of a brush wherein the bristles are arranged in several groups; and

FIG. 8 is a fragmentary transverse section similar to FIG. 5 through a mold for the bristles of the brush shown in FIG. 7.

Referring now in greater detail to the drawings, and first to FIG. 1, there is shown a molded plastic article in the form of a manicure brush A having an elongated backing element 10 and a plurality of bristles 11. The bristles are integral with and project from the upper side or face of the backing element 10.

In accordance with one embodiment of my invention, the bristles 11 are of triangular cross section, as shown in FIG. 2, and are arranged in elongated pairwise arranged rows 12, 13 which extend in the longitudinal direction of the backing element 10. The bristles forming part of the row 12 partially extend into the spaces defined by the bristles in the adjacent row 13. In other words, when the brush is viewed endwise as shown in FIG. 1, the foremost bristle 11 of each row 12 partly conceals the foremost bristle 11 of the adjacent row 13 or vice versa. The width of the gap 31 between the bristles in the row 13 of the group or pair 14 and the bristles in the row 12 of the group or pair 15 is exaggerated for the sake of clarity. As a rule, this gap is rather negligible and normally need not substantially exceed the maximum transverse dimension of a bristle. The distance between the groups 14, 15 etc. of pairwise arranged bristle rows 12, 13 depends on the thickness of spacer plates which form part of the bristle mold and which will be described in greater detail in connection with FIGS. 5 and 6.

Owing to such minimal spacing between the bristles in the rows 12, 13, the brush A may be formed with an exceptionally large number of bristles per unit area; this improves the brushing effect when the finished article is put to actual use. The brushing effect is further improved because the tips 16 of bristles in each row 12 are bent in a direction away from the tips 17 of bristles in the adjacent row 13 so that the tips 16, 17 constitute elastic hooks which engage with the brushed surface to remove impurities or to produce an invigorating effect depending upon whether the brush is used as a means for removing foreign matter from a textile or like material or whether the brush is used as a means for massaging or otherwise treating the skin, hair, fingernails, etc. The tips 16 of the bristles 11 in each row 12 will engage with the treated surface when the brush is moved in a first direction, and the tips 17 of the bristles in the rows 13 will treat the same surface when the brush A is moved in the opposite direction.

A similar effect is produced if the tips **16**, **17** of the bristles in adjacent rows **12**, **13** cross each other, i.e. if the tips **16** are bent to the right and the tips **17** are bent to the left, as viewed in FIG. 1, as long as these tips are mutually inclined in and counter to the directions in which the brush is normally moved in actual use. It is equally possible to form the bristles in each of rows **12**, **13** in such a way that the bristles whose tips are inclined in one direction alternate with bristles in the same row whose tips are inclined in the opposite direction.

The pairs of rows **12**, **13** may extend through the full length of the backing element **10** or they may be interrupted to form a series of sections in a manner as shown in FIG. 7. It will be noted that each bristle in a row **12** or **13** has an outer face disposed in a common plane with the outer faces of all other bristles in the same row.

FIG. 3 shows a brush B whose backing element **10** is integral with bristles **111** of trapezoidal cross-section contour. In FIG. 4, the backing element **210** of the brush C carries rows of bristles **211** of semicircular cross-sectional contour.

Referring now to FIGS. 5 and 6, there is shown a portion of a mold **20** for the manufacture of brushes of the type shown in FIGS. 1 and 2. The mold comprises a plurality of parallel mold plates **21** and spacer plates **22** which alternate with the plates **21**. The sides of the mold plates **21** are formed with elongated bristle grooves **23**, **24** of triangular cross section, the grooves **23** being utilized for the formation of bristle rows **12**, and the grooves **24** receiving mold material to form the bristle rows **13**. The web **26** of material between the grooves **23**, **24** is of zig-zag shape because the grooves **23** extend into the material between the grooves **24** and vice versa. Excepting for the configuration of the groves, the molds utilized for the manufacture of bristles **111** or **211** shown in FIGS. 3 and 4 are of identical construction.

The manner in which the mold **20** may be operated and the apparatus for the manufacture of molded bristles are fully described in the aforementioned application Serial No. 708,952. The plates **22** seal the grooves **23**, **24** and permit convenient separation of the molded bristles from the walls of grooves **23** and **24**.

As shown in FIG. 6, one end of each groove **23**, **24** tapers toward the adjacent spacer plate **22** as is indicated at **27**, **28**, respectively. When the material of the bristles formed in such grooves hardens, the tips **16**, **17** are automatically bent in a manner as shown in FIG. 1 as soon as the mold **20** is taken apart.

FIG. 7 shows a brush D whose bristles **311** are arranged pairwise in adjacent rows, the bristles of one of the adjacent rows being staggered with respect to the bristles of the other of the adjacent rows, the adjaecnt rows consisting of sections **312***a*, **312***b* . . . **312***n*–**1**, **312***n* and **313***a*, **313***b* . . . **313***n*–**1**, **313***n*. The sections **312***a* are separated from the sections **312***b* by a gap **330** which extends in a direction transverse to the longitudinal direction of the backing element **310**. In addition to improving the appearance of the brush, the provision of gaps **330** brings about the advantage that the brush may be cleaned with greater ease because any comparatively large impurities concealed between the bristles adjacent to the bristle roots, i.e. close to the bristle supporting side of the backing element **310**, may be flushed or blown into and through the gaps **330**. The zig-zag gaps between the adjacent sections **312***a*, **313***a* etc., serve the same purpose.

Referring to FIG. 8, there is shown a mold **320** for the bristles **311** of the brush D. This mold comprises grooved mold plates **321** whose length at least equals the combined length of a row of bristles that are staggered relative to the bristles of its adjacent row and consisting of sections **312***a*–**312***n*, and shorter spacer plates **322**, which are received in cutouts **329** formed in the sides of mold plates **321**. The grooves **323** extend inwardly from the cutouts **329** so that each spacer plate may seal the grooves **323** in a first mold plate **321** and the grooves **324** in an adjacent second mold plate.

It will be readily understood that the rows of bristles may be arranged in a number of different ways. For example, and referring to FIG. 7, the gaps **330** between the sections of bristle rows may be inclined with respect to the longitudinal direction of the backing element **310**, they may assume an undulate shape, the pairwise arranged rows of bristles may extend transversely to the longitudinal direction of the backing element, the rows of bristles need not be straight but may assume a circular, oval, zig-zag, undulate or other form without in any way departing from the spirit of this invention as long as the bristles in each pair of rows are so close to each other that the bristles of one row extend into the spaces formed by the adjacent bristles of the other row.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omiting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is:

1. A plastic brush comprising a backing element having a bristle-supporting side and a plurality of long, slender bristles integral with and projecting from said side, said bristles arranged in a plurality of pairwise disposed rows each comprising a plurality of closely adjacent bristles, the adjacent bristles of each row defining between themselves spaces and the rows of bristles in each pair of rows being in such close proximity of each other that the spaces defined by the bristles in one row at least partially receive and that substantial portions of such spaces are filled by the bristles in the other row of the respective pair of rows, and said pairs of rows defining between themselves elongated gaps which communicate with the spaces defined by the bristles adjacent thereto.

2. A plastic brush comprising a backing element having a bristle-supporting side and a plurality of long, slender bristles integral with and projecting from said side, said bristles arranged in a plurality of pairwise disposed rows each comprising a plurality of closely adjacent bristles, the adjacent bristles of each row defining between themselves spaces and the rows of bristles in each pair of rows being in such close proximity of each other that the spaces defined by the bristles in one row at least partially receive and that substantial portions of such spaces are filled by the bristles in the other row of the respective pair of rows, each of said bristles having a tip distant from said backing element and the tips of bristles in one of each pair of rows inclined with respect to the tips of bristles in the other row of the respective pair of rows, and said pairs of rows defining between themselves elongated gaps which communicate with the spaces defined by the bristles adjacent thereto.

3. A plastic brush comprising an elongated backing element having a bristle-supporting side and a plurality of long, slender bristles integral with and projecting from said side, said bristles disposed in a plurality of pairwise arranged rows extending in the longitudinal direction of the backing element and each row comprising a plurality of closely adjacent bristles, the adjacent bristles of each row defining between themselves spaces and the rows of bristles in each pair of rows being in such close proximity of each other that the spaces defined by the bristles in one row at least partially receive and that substantial portions of such spaces are filled by the bristles in the other row of the respective pair of rows, and said pairs of rows defining between themselves elongated gaps which communicate with the spaces defined by the bristles adjacent thereto.

4. A plastic brush comprising an elongated backing element having a bristle-supporting side and a plurality of

long, slender bristles integral with and projecting from said side, said bristles disposed in a plurality of pairwise arranged rows consisting of sections and extending in the longitudinal direction of the backing element and the sections of each row comprising a plurality of closely adjacent bristles, the adjacent bristles of each section defining between themselves spaces and the rows of bristles in each pair of rows being in such close proximity of each other that the spaces defined by the bristles in each section of one row at least partially receive and that substantial portions of such spaces are filled by the bristles in the adjacent section of the other row of the respective pair of rows, said sections defining between themselves gaps extending substantially transversely to the longitudinal direction of said backing element said transversely extending gaps communicating with the spaces defined by the bristles adjacent thereto, and said pairs of bristle rows defining between themselves gaps extending substantially in the longitudinal direction of said backing element, said longitudinally extending gaps communicating with the spaces defined by the bristles adjacent thereto.

5. A plastic brush comprising a backing element having a bristle-supporting side and a plurality of long, slender bristles integral with and projecting from said side, said bristles arranged in a plurality of pairwise disposed rows each comprising a plurality of closely adjacent bristles, the adjacent bristles of each row defining between themselves spaces and the rows of bristles in each

pair of rows being in such close proximity of each other that the spaces defined by the bristles in one row at least partially receive and that substantial portions of such spacers are filled by the bristles in the other row of the respective pair of rows, the spaces defined by the bristles of each pair of rows together constituting a narrow substantially zig-zag shaped gap whose width is a small fraction of the maximum transverse dimension of a bristle.

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