

June 4, 1957

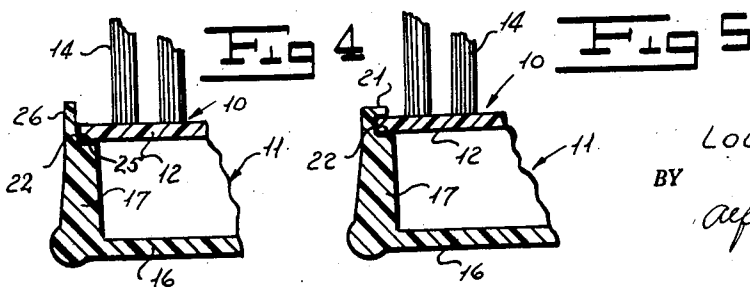
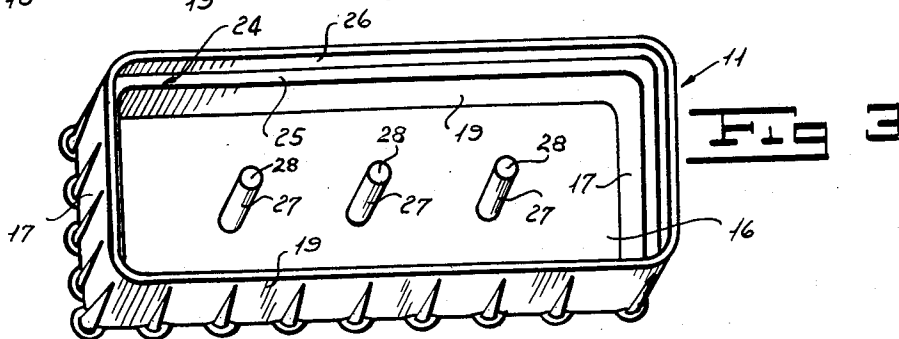
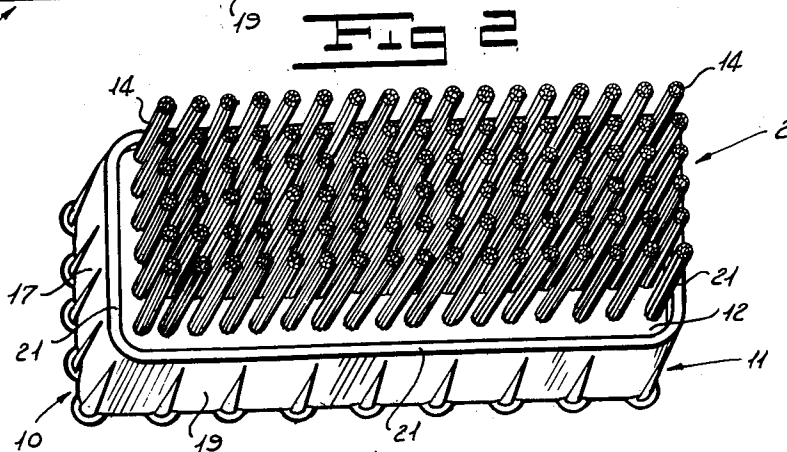
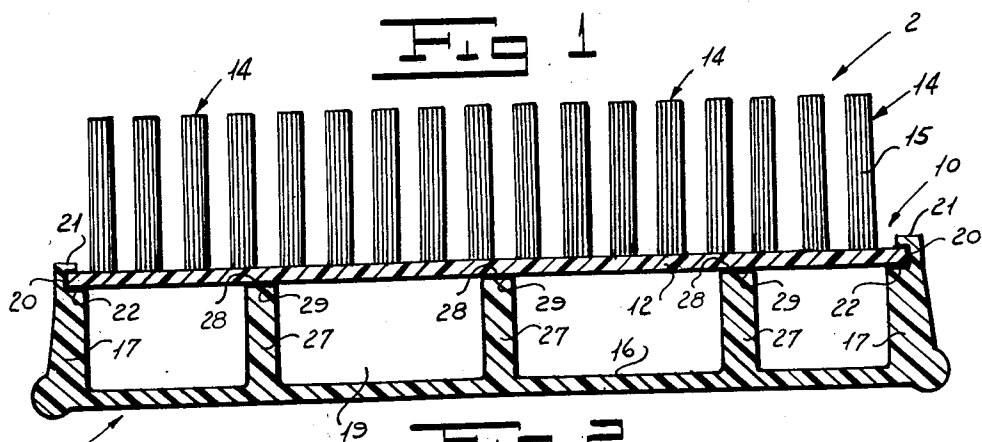
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2,794,201

BRUSH

Filed Aug. 26, 1953

2 Sheets-Sheet 1



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FIG 6

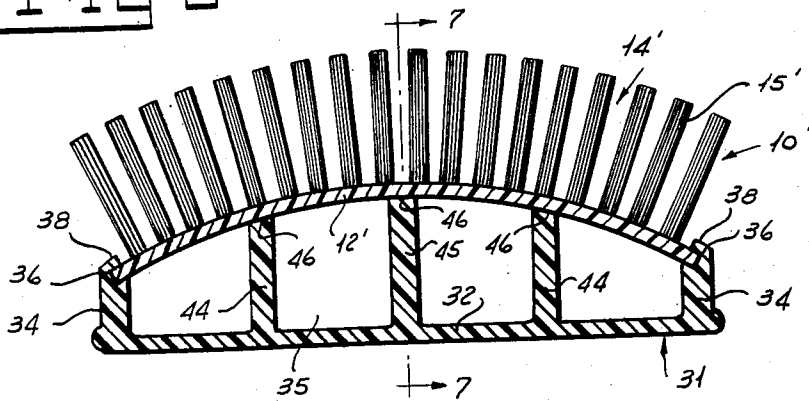


FIG 8

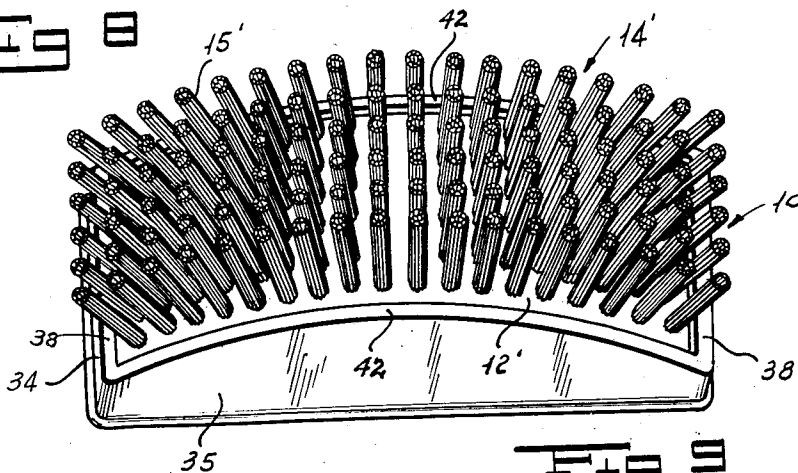


FIG 7

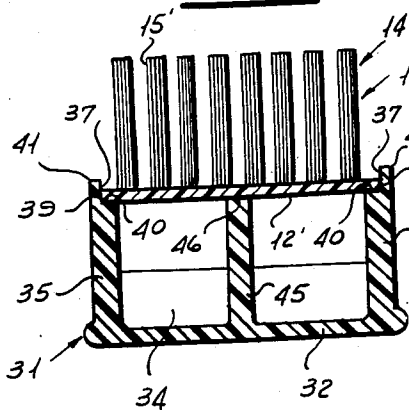
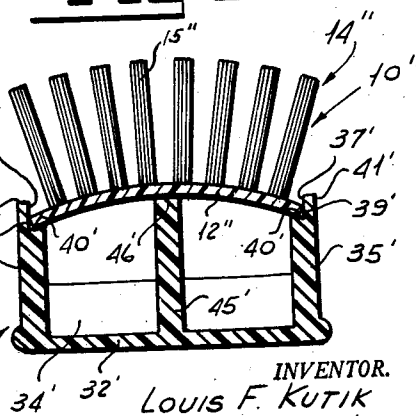


FIG 9



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2,794,201

BRUSH

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Application August 26, 1953, Serial No. 376,552

12 Claims. (Cl. 15—187)

This invention relates to an improved brush. The brush of the invention includes a novel brush element which has its bristles integral with the backing element, the backing element being thin and flexible. The invention also relates to a brush composed of said brush element and a novel holding member for such brush element.

In the prior art, brushes such as toothbrushes, clothes-brushes, nailbrushes, and the like, have usually been made by the following process: The brush backing member has been drilled, tufts of bristles have been inserted in such drilled openings, and the tufts have been cemented or otherwise secured in place in such openings.

It has been proposed to make brushes by forming bristle tufts and holding them by a templet in the desired orientation. The brush backing member is then to be formed by being molded in contact with the lower ends of such bristle tufts, thereby bonding the tufts to the brush backing.

The usual commercial method set forth above has been slow, expensive and tedious, as can be readily appreciated from the fact that each tuft of bristles had to be placed in the drilled openings in the brush backing by hand. In the proposed method set out above, wherein the backing is molded against the bristles, the bond between the bristles and the brush backing has very often proved to be faulty, because of the chilling effect exercised on the injected plastic forming the brush backing element by the bristle ends, because of the lack of time to allow full permeation of such plastic into the bristle tuft and into contact with each bristle thereof, and thus there frequently is no effective bonding between those bristles which the plastic material does contact and the brush backing plastic material.

The brush of the present invention includes a brush element having a thin flexible backing element with which the bristles protruding therefrom are integral. Such brush element may be formed by the apparatus shown and described in my application Serial No. 376,592, entitled "Method of and Apparatus for Molding Plastic Materials," filed concurrently herewith. In such apparatus the mold cavity for the backing element is formed by two separable mold parts, the bristles being molded in thin elongated recesses defined by flutes on the sides of a plurality of ejecting and molding pins and the bores in one mold part in which the pins reciprocate. The backing element is thin and flexible, having a thickness no greater than one-eighth inch, and preferably lying in the range of .03 to .12 inch. The presently preferred embodiment of the brush employs a backing element having a thickness of approximately .040 inch.

As a result of such construction, due to the thinness of the brush backing element, the chilling of all parts of the brush, including the backing element and the bristles, is more nearly uniform, and the time required for such chilling is noticeably reduced. Further, the brush element thus produced is quite flexible both longitudinally and transversely thereof, so that it readily conforms to a brush element holding body, either flat or curved, provided to hold it. When mounted on a holder

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which causes the brush element to assume a curved position, the element, because of the thinness of the backing element thereof, is not unduly strained in any portion thereof. Since the integral brush element is customarily formed of relatively high-priced plastic material, the formation of the backing element as a thin flexible member is an obvious economy.

The brush element holding body is characterized by its attractive appearance, by the ease with which it is molded, and by the ease with which the brush element is mounted therein and permanently secured thereto. The resulting brush, that is, the combination of the brush element and the holding element, when finally assembled, is characterized by its lightness and by the durability of the brush element and of the joint between such element and the holding body.

It is accordingly among the objects of my invention to provide an improved flexible brush element having the bristles integral with the backing element, all surfaces of the bristles being molded to final contour and preferably substantially all surfaces of the backing element being molded to such final contour.

A further object of my invention resides in the provision of a novel body for holding the above brush element, the holding body being characterized by its lightness, the ease of mounting and securing a brush element thereto, and the permanence of the connection which may be effected between the brush element and the holding body.

A still further object of the invention resides in the novel combination, in a completed brush, of the above holding body and the improved brush element of my invention.

Further objects, and objects relating to details and economies of construction, manufacture, and use, will more definitely appear from the detailed description to follow.

My invention is clearly defined in the appended claims. Where parts are for clarity and convenience referred to on the basis of their oriented position shown in the accompanying drawings, no limitation as to the positioning of the structure is to be implied, since it is to be understood that the brush may be placed in any position. Also, in both the description and the claims, parts at times may be identified by specific names for clarity and convenience, but such nomenclature is to be understood as having the broadest meaning consistent with the context and with the concept of my invention as distinguished from the pertinent prior art. The best forms in which I have contemplated applying my invention are illustrated in the accompanying drawings forming part of this specification, in which:

Fig. 1 is a view in vertical section through the first embodiment of the brush of my invention, the section being taken along the longitudinal center line of the brush.

Fig. 2 is a view in perspective of the brush of Fig. 1.

Fig. 3 is a view in perspective of the brush element holding element of the invention.

Fig. 4 is a fragmentary view in vertical section through the brush, the section being taken in the same manner as in Fig. 1, the brush element and holder being shown in preliminarily assembled position.

Fig. 5 is a fragmentary view in vertical section corresponding to Fig. 4, the brush element being shown in finally assembled position on the holder.

Fig. 6 is a view in vertical section through a second embodiment of the brush of the invention, the brush being curved longitudinally thereof, the section being taken along the longitudinal center line of such brush.

Fig. 7 is a transverse vertical section through the brush of Fig. 6, the section being taken along the line 7—7 in

Fig. 6, the brush element and the holder therefor being shown in preliminarily assembled condition.

Fig. 8 is a view in perspective of the finished assembled brush of the second embodiment of the invention.

Fig. 9 is a view in transverse section, similar to Fig. 7, of a brush which is curved transversely.

As is apparent from the above, there are shown herein three embodiments of the brush of the invention, the first embodiment being shown in Figs. 1-5, inclusive, the second embodiment being shown in Figs. 6, 7, and 8, and the third embodiment being shown in Fig. 9. The brush of Figs. 1-5, inclusive, is designated as a whole by the reference character 2. Such brush is made up of the brush element, generally designated 10, and the holding member or handle therefor, generally designated 11. The brush element 10 is composed of a flat, thin flexible backing element 12, which is integral with the bristles 15 which rise approximately normal thereto, such bristles being disposed in tuft-like groups generally designated 14. Generally, the backing element 12 is formed in a mold cavity between two separable mold parts, the bristles 15 integral therewith being formed in a plurality of thin elongated spaces formed by flutes on a series of pins whose inner ends are in communication with the cavity between the mold parts and the walls of the bores in which the pins reciprocate. As a result of such method of molding of the brush element, all surfaces of the bristles are molded to their final contour, the bristles are arranged in a plurality of closely spaced tuft-like groups formed by a plurality of bristles disposed in closely spaced relationship around a hollow center, and preferably all surfaces of the backing element 12 except where the sprue connects thereto are also molded to finished contour.

In Figs. 1-5, inclusive, the brush and the parts thereof are shown inverted from their normal position of use, in which the bristles are downward, for ease of illustration of the brush and of the method in which it is formed. The parts of the brush will be referred to in the oriented position shown. The body 11 has an extended portion 16, shown at the bottom, from the ends of which rise the end walls 17 and from the sides of which rise the side walls 19, such walls being integrally connected as shown in Fig. 2. The body 11 is preferably formed as an integral molding of plastic material.

In the finished brush, shown in Figs. 1 and 2, the side and end edges of the backing element 12 are securely held within a seat formed by a plurality of channels in the end and side walls 17 and 19 of the holder member 11, each such channel having an inwardly facing groove 20. The backing element 12 is securely held in each channel by the bead 21 which overlies the edge of such backing element and which constitutes the outer flange of the channel. A layer of adhesive 22, applied to the parts during their assembly, seals the thus formed joint against the intrusion of water into the interior of the holder.

Preferably the holding member 11 is initially molded in the form shown in Fig. 3, wherein the upper inner edges of the side and end walls are formed with a seal provided by the rabbet-like inwardly facing groove 24. Groove 24 has a horizontal surface or ledge 25 and an outer upstanding flange portion 26. The backing element 12 for a given brush is formed of such length and width as snugly to fit within the thus formed seat. In assembling the brush, either the edge of the backing element 12, the two surfaces of the rabbet-like groove 24, or all such surfaces, are first coated with a layer of water resistant adhesive, after which the backing element is inserted in the seat in the holder in the manner shown in Fig. 4. Following such assembly, the flange 26 of the holder is deformed as by a rolling tool to cause it to extend down and inwardly in the form of the bead 21 overlying the upper edge of the backing element 12.

In order to prevent undue flexure of the relatively thin backing element during use, the holder body 11 is provided with a plurality of substantially equally spaced up-

standing pillars 27 disposed along the longitudinal center line of the body as shown in Fig. 3. Such pillars are designed to contact the lower surface of element 12 to furnish center support therefor. Preferably to prevent any "pumping" action of the element 12, the pillars 27 are made so that their upper ends 28 lie at least slightly above the level of the ledge 25 of the seat of the holder. It has been found that satisfactory results are yielded when the pillars 27 are made to extend from five to ten thousandths of an inch above such ledge. If desired, the upper ends of the pillars may be provided with a layer of adhesive 29 at the time of the assembly of the brush element in the holder.

The brush element, which includes the backing element 12 and the bristles 15, is preferably made of nylon, although for some applications polyethylene is satisfactory. The brush element holder 11 is formed of a more economical plastic material, such as high impact polystyrene, which may be markedly deformed, as by pressing or rolling the flange 26 downward to form the bead 21, without being cracked and without substantial tendency of the plastic to return to its original shape. A satisfactory polystyrene for this purpose is one made by the Dow Chemical Company designated "Dow No. 475."

As previously pointed out, the brush element of the invention, because of the thinness and flexibility of the backing element thereof, may be materially deformed from the initially flat condition of the backing element in which it is preferably molded without unduly straining any of the parts of the brush element. As a consequence, the brush element can be employed in connection with a brush element holder having a seat with a configuration markedly different from a plane. One such brush of this type is shown in Figs. 6, 7, and 8, which illustrate a second embodiment of the brush of the invention.

In Figs. 6, 7, and 8, the parts of the brush element which are the same as those shown and described in connection with Figs. 1-5, inclusive, are designated by the same reference characters with an added prime. The brush element 10' is shown with its backing element 12' flexed convexly longitudinally and permanently held in such condition by the holder generally designated 31. Such holder, as before, has an extended bottom element 32 from which rise the end walls 34 and the side walls 35, such walls being integrally connected. In this embodiment, to facilitate the assembly of the brush element 10' on the holder, the grooves 36 in the upper inner edges of the end walls 34 are preferably formed during the molding of the holder 31. The side walls 35 are formed with their upper edges lying along the general curve which the brush element is to assume, the upper edges of the side walls being provided with inwardly facing rabbet-like grooves 39. Grooves 39 are provided with a ledge 40 which merges on the end of the holder with the bottom surface of the groove 36 in the end walls, and with an upstanding outer flange 41, as more clearly shown in Figs. 7 and 8.

The holder 31 is provided with a series of longitudinally spaced pillars, preferably situated on the longitudinal center line of the holder, the center, longer pillar being designated 45 and the two shorter end pillars being designated 44. Preferably each of such pillars is of such length as to lie slightly above the ledges 40 on the side walls of the holder in the location of the transverse plane containing such pillar. The same distance differential, that is, from five to ten thousandths of an inch, as employed in the first embodiment, has proved satisfactory.

In assembling the brush of Figs. 6, 7, and 8, a brush element of the correct length is flexed longitudinally to a somewhat more pronounced curve than that shown in Fig. 6, whereby the backing element may have its projected horizontal length reduced so that the ends of the backing element 12' may be snapped into the grooves 36. Preferably the ends of the backing element, the inner surfaces of the grooves 36, or both, are first coated with

a layer of adhesive before such assembly. Preferably also, either the side edges of the backing element, the surfaces of the rabbet-like groove 39, or both, are also coated with adhesive before such assembly. When the brush element has been thus preliminarily assembled on the holder, it is stably held in the position shown in Fig. 6. Thereupon the flanges 41 on the tops of the side walls are deformed as by a rolling tool to cause them to extend inwardly in the form of the bead 42 which overlies the edge of the backing element 12. As with the first embodiment, a layer of adhesive, shown at 46, may be employed between the top surfaces of the pillars 44, 45 and the backing element 12' to insure the secure holding of the backing element to the pillars.

The embodiment of the brush shown in Fig. 9 illustrates the flexibility of the brush member in both transverse and longitudinal directions. The embodiment of the brush there shown may be either flat longitudinally or it may be curved lengthwise, as in the embodiment shown in Figs. 6, 7, and 8.

In Fig. 9 the elements of the brush corresponding to those of Fig. 7 are designated by the same reference characters but with an added prime. The pillar 45' of Fig. 9 extends substantially outwardly beyond the seat formed by the rabbet-like grooves in the end and side walls of the brush element holder. As a consequence the outer ends of the bristles on the two longitudinal edges of the brush lie a substantial distance beyond the sides of the holder 31', which is of advantage in sink and floor scrubbing brushes.

Although for purposes of illustration I have shown and described preferred embodiments of the novel brush element, brush element holder, and the combination thereof of my invention, it is to be understood that the invention is not to be restricted thereto since it is capable of considerable variation as to details. The invention is, therefore, to be defined by the scope of the claims appended hereto.

I claim as new the following:

1. A brush element having bristles and a thin flexible backing element to which the bristles are connected, the bristles being disposed on the backing element in hollow tube-like groups spaced from each other, said bristles and said backing element being made of plastic material and being integral, substantially all surfaces of the bristles and substantially all surfaces of the backing element being formed to finished shape.

2. A brush having a brush element provided with bristles and a thin flexible backing element to which the bristles are connected, the bristles being disposed on the backing element in hollow tube-like groups spaced from each other, said bristles and said backing element being made of plastic material and being integral, said brush element being held in a hollow body element having an extended portion and sides and ends rising therefrom, said sides and ends providing a seat in which the brush element is secured.

3. A brush element having bristles and a backing element to which the bristles are connected, the bristles being disposed on the backing element in hollow tube-like groups spaced from each other, said backing element being thin and flexible and having a thickness no greater than one-eighth inch, said bristles and said backing element being made of plastic material and being integral.

4. A brush having a brush element provided with bristles and a thin flexible backing element to which the bristles are connected, the bristles being disposed on the backing element in hollow tube-like groups spaced from each other, said backing element having a thickness no greater than one-eighth inch, said bristles and said backing element being made of plastic material and being integral, and a hollow brush element holding body to which the brush element is secured, said body having an extended main portion and sides and ends rising therefrom, the sides and ends providing a seat having a ledge parallel to the broad extent of the backing element and a side

wall bordering the ledge, for the reception of the brush element, and at least one pedestal projecting from the main portion of the body within the cavity therein to support the backing element of the brush member.

5. A brush element having bristles and a backing element to which the bristles are connected, said backing element being thin and flexible, said bristles and said backing element being made of plastic material and being integral, the bristles being disposed on the backing element in hollow tube-like groups formed by a plurality of bristles disposed in closely spaced relationship around a hollow center.

6. A brush element having bristles and a backing element to which the bristles are connected, said backing element being flexible and having a thickness no greater than $\frac{1}{8}$ inch, said bristles and said backing element being made of plastic material and being integral, the bristles being disposed on the backing element in hollow tube-like groups of small diameter, the groups being composed of a plurality of bristles disposed in closely spaced relationship around a hollow center.

7. A brush element having spaced tuft-like groups of bristles and a backing element to which the bristles are connected, said backing element being flexible and having a thickness on the order of .04 inch, said bristles and said backing element being made of plastic material and being integral, all surfaces of the bristles being molded to finished shape, the bristles being disposed on the backing element in hollow tube-like groups.

8. A brush having in combination a brush element provided with a backing element, bristles rising from the backing element, and a body receiving and holding the brush element, said body comprising a hollow molded plastic member having an extended portion and sides and ends rising therefrom, the inner side edges of the sides and ends having channels presenting a brush element receiving seat between them, the edges of the backing element being positioned and permanently secured in such seat by deformed outer flanges.

9. A brush having in combination a brush element provided with a backing element, bristles rising from the backing element, and a body receiving and holding the brush element, said body comprising a hollow molded member having an extended portion and sides and ends rising therefrom, the inner side edges of the sides and ends having channels presenting a brush element receiving seat between them, the edges of the backing element being positioned in and sealed to the seat, the edges of the backing element being permanently secured in such seat by deformed outer flanges of the channels.

10. A brush having in combination a brush element and a holding body for the brush element, the brush element having bristles and a thin flexible backing element to which the bristles are connected, said brush element mounting body comprising an integral hollow molded shape having an extended portion and sides and ends rising therefrom, the sides and ends at their outer edges being channeled to present a brush element receiving seat between them within which the edge of the backing element is seated and to which it is sealed and permanently secured, said body having a plurality of spaced pillars extending from the inner surface of the extended portion substantially along the longitudinal center line of the body, the outer ends of the pillars extending slightly beyond the lower edge of the groove in the sides of the body in the transverse plane containing each pillar, whereby to bias the backing element outwardly at the location of the pillars, the edges of the backing element being secured in the seat by deformed outer flanges of the channels.

11. A brush having in combination a brush element and a holding body for the brush element, the brush element having bristles and a thin flexible backing element to which the bristles are connected, the backing

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element being held in a curved form by the holding body, said brush element mounting body comprising an integral hollow molded shape having an extended portion and four sides rising therefrom, at least two opposite sides being curved at their outer edges and having curved inwardly open grooves within which is seated the edge of the backing element, said body having a plurality of pillars extending from the inner surface of the extended portion substantially along the longitudinal center line of the body, the outer ends of the pillars supporting the backing element in its curved form.

12. A brush having in combination a brush element and a holding body for the brush element, the brush element having bristles and a thin flexible backing element to which the bristles are connected, the backing element being held in a curved form by the holding body, said brush element mounting body comprising an integral hollow molded shape having an extended portion and sides and ends rising therefrom, the sides being curved at their outer edges and having curved inwardly open grooves within which is seated the edge of the backing element, the ends having substantially straight

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inwardly open molded grooves forming a part of the seat for the brush element, said body having a plurality of pillars extending from the inner surface of the extended portion substantially along the longitudinal center line of the body, the outer ends of the pillars supporting the backing element in its curved form, the portions of the sides of the body defining the outer surfaces of the grooves therein having been formed by deformation of the sides after they were molded and with the backing element in such grooves.

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