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UNITED STATES TARIFF COMMISSION
WASHINGTON

TARIFF INFORMATION SERIES—No. 8

THE BRUSH INDUSTRY

COMMERCIAL AND INDUSTRIAL CONDITIONS IN
THE UNITED STATES AND IN FOREIGN COUN-
TRIES—TARIFF LAWS AFFECTING BRUSHES—
COURT AND TREASURY DECISIONS



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UNITED STATES TARIFF COMMISSION.

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INTRODUCTION.

This pamphlet is one of a series which the United States Tariff Commission is publishing as an aid to the study and clearer understanding of the tariff and its bearing on various industries. It is divided into five parts.

First. Competition among domestic manufacturers in the various branches of the industry; foreign trade, as shown by imports, exports, and duties collected.

Second. The status of the brush industry in the United States, including definitions and general information in regard to processes of manufacture for the different kinds of brushes, as assembled from official publications and statements made by manufacturers.

Third. Review of the brush industry and trade in foreign countries, compiled from United States Consular Reports and foreign official publications.

Fourth. Statistical tables for the manufacture of brushes in the United States; imports and exports for a series of years; revenue received; and rates of duty for representative years under each of the four tariff acts—1894, 1897, 1909, and 1913.

Fifth. Synopsis of the provisions of the various tariff laws relating to brushes and the raw materials consumed in their manufacture; Abstract of Court and Treasury Decisions.

The Commission has had the services of CHARLES F. YAUCH, special expert, in the preparation of this pamphlet.

TRADE AND COMPETITION.

TRADE AND COMPETITION.

Competition is keen among domestic manufacturers of brushes, as there is no association to regulate the trade. The industry has profited by the partial elimination, during the war, of European competition and by the large orders for brushes by the Government, the Red Cross, and foreign countries whose trade before the war was supplied by the brush-producing countries of Europe.

Official statistics do not show the quantity, kinds, or grades of brushes imported; the information herein given in regard to the character of foreign competition is therefore largely from statements of manufacturers, importers, and dealers.

Toilet brushes.—Foreign competition in the past has been almost entirely on toilet brushes. It has been estimated that from 50 to 60 per cent of the toilet brushes used in the United States are imported.

The following statements were made at the conference of the United States Tariff Commission with representatives of the Brush Industry, held in New York City, March 25–26, 1918.

Before the Ways and Means Committee some years ago the statement was made to me, "There are eleven or twelve million dollars worth of brushes manufactured in this country, and you only import two or three million?" Take the paintbrush industry away and what do you find? You find that we barely make 40 per cent of the toilet brushes used in the country and that the other 60 per cent is supplied from abroad.

The toilet-brush industry battles with labor and conditions in Japan and Europe which dwarfed its development in this country to such a degree that the industry is practically given over to special lines only, as none of us can make a full line of toilet brushes, whether hair, tooth, or other shapes, against the keen competition that we meet here. (From the statement of Mr. H. Alexander of the Henry L. Hughes Co., manufacturers.)

In normal times I think over 50 per cent of the toilet brushes used in this country are made in Europe and Asia. (From the statement of Mr. William Cordes, of the Florence Manufacturing Co.)

Importers, on the other hand, claim that they encounter strong competition from domestic manufacturers of toilet brushes.

I wish to differ with some of the testimony already given to the effect that the importers do 60 per cent of the total business of toilet brushes, leaving 40 per cent for the domestic makers.

The tariff on importations of sorted bristles is 7 cents a pound. So much per pound, and for that reason a man can import bristle and put it into a paintbrush or into a hairbrush, where the handle is of little value, much cheaper than he can import

the finished article and pay a 35 per cent duty on it, and that is the reason that the domestic paintbrush makers and the hairbrush makers have the largest part of the business. The business left to the importers, as has been stated, is the toothbrush business and the better grade of hairbrushes, hand drawn.

In Japan prices have gone consistently up since the beginning of the war, partly due to the increased cost of labor and partly to the increased cost of raw material, and to a certain extent on account of the buying of other markets, such as South America, London, Australia, and New Zealand, which markets were not chiefly supplied by Japan before the war. We find they are paying prices constantly which are hard to obtain in this market, and at times it has been difficult to obtain supplies in quantities sufficient to meet the demand here for that reason.

We are perhaps a little jealous of the position of American makers. Through advertising done extremely well they have developed trade-marks of value which really place their products beyond price competition. We would like to be in that position ourselves, but unfortunately we are not.

Foreign competition after the war is overestimated. The scarcity of bristles in every brush-producing nation will prevent any accumulation of stock to be dumped here. The countries of Europe are fighting with every man who is able to stand on his feet. They are cut off from their source of supply of raw material; they are disorganized and lack capital to increase their production rapidly. Their prices have been and will be constantly advancing much faster than here. Profits may be cut out a little, but if the production is small it will have but little effect on conditions here for some years after peace is declared. (From the statement of Mr. W. B. Gibson, importer.)

On the cheaper grades of hairbrushes we can not compete. The United States Government, in buying goods for the soldiers, buys domestic hair brushes, and we can not quote them anything as good at as low a figure. The United States Navy buys military brushes made in this country, and we are unable to quote on those brushes. We can not meet the domestic prices. The only business we can get from the Government is the toothbrush business. The Government requires a low-priced brush, something that sells for about 10 cents apiece. This is all the soldiers can afford to pay for toothbrushes in the cantonments, and that is the only business we can get. (From the statement of Mr. G. S. Gibson, importer.)

The brush business * * * is largely controlled in the United States by the domestic manufacturers, with the exception of the toothbrush industry.

The domestic manufacturers will bring up the argument that they are unable to compete with the French article on account of the price. But in the course of their production they make use of a great many demonstrations. For instance, they will go to a department store and they will put into that department store a demonstrator or a sales person, which costs them so much per week, and that must be taken into account in considering the cost of production of the brush. (From the statement of Mr. Louis d'Angelo of the Cauvigny Co.)

I believe the main point to be brought out is whether or not the domestic brushes can compete with the foreign-made article. I maintain that they can. My experience has been that when we submit (to Japanese manufacturers) a cement-faced brush, an aluminum-faced brush, a porcelain-faced brush, a two-piece wire-drawn brush, or a solid-backed machine-made brush, we invariably receive a reply that nothing can be done on that class of goods. That takes in bath, hair, nail, hat, and cloth brushes. (From the statement of Mr. O. Zincke, importer.)

The total production of toilet brushes in the United States, according to the Federal Census of 1914, was valued at \$3,312,870. The total value of all brushes imported amounted to \$2,180,853 for the fiscal year 1914. The last named amount does not represent the

value of the goods laid down, duty paid, in the United States, but the actual market value or wholesale price, at the time of exportation to the United States, in the principal markets of the country whence exported. In comparing production and importation, allowance should be made for consular fees, ocean freights, marine insurance, duties, other charges, and importers' profit.

Toilet brushes, such as tooth, hair, nail, bath, cloth, hat, and shaving brushes, are imported in normal times from France, Japan, Germany, England, and Austria. The French product is noted for its artistic and graceful design and is generally of the solid-back, handmade, trepanned type. The English brush is very different from the French product in appearance. With the exception of tooth and shaving brushes, the English type is a two-piece, hand-drawn brush, the parts of which are fastened together with screws, which add to the general effect of solidity and substantial appearance. The highest grades of brushes imported come from these two countries. They largely supply a class of trade which calls for certain special English or French makes, or which simply prefers the foreign to the domestic article.

The representative of a French company made the following statement:

Aside from making the cheap goods with which we are unable to compete, domestic manufactures also make a very fine grade of brushes. The S. E. Howard's Sons & Co. has the distinction of making as good a line as any that could be purchased in Europe. The firm of Whiting & Adams, of Boston, make the very best line of hairbrushes, without exception, that can be produced. * * *

The sale of French brushes in this country is not due to their beautiful finish, because they can make just as good a finish here, but it is due to the fact that there is a certain element of people who like to have something French and who are willing to pay the prices. (From the statement of Mr. Louis D'Angelo of the Cauvigny Co., importers.)

An American manufacturer of high-grade brushes gave the following testimony:

In normal times we have difficulty in meeting the competition of Dupont, of France, and Kent, of England; since 1914 we have had but little competition. (From the statement of Mr. W. C. Howard, manufacturer.)

Brushes imported from Germany and Austria are not, as a rule, the equal of those imported from France and England, though Austria has exported to the United States some brushes which rival the French product in style. The cheaper and medium-grade goods are supplied by Germany, where the styles of other countries are copied or imitated. Although Germany and Austria follow largely the hand system of drawing, they also produce machine-made brushes, which are exported to the United States and which come in competition with similar goods in this country. Japan's product is more or less a copy of the designs produced in other countries, and she

exports many of the cheaper grades. In the last few years the quality of Japanese brushes has improved, and Japan has overcome to some extent the unfavorable impression that her product is cheap and inferior.

Although toothbrushes are used more extensively in the United States than elsewhere, the domestic production is small. There are not more than three or four factories in this country engaged in the manufacture of toothbrushes, and none of them make toothbrushes exclusively. They do not make a general line of toothbrushes, but produce only those of special device, or under patents, which retail from 35 to 50 cents each. In England and France bone handles are used; in Austria, Germany, and Japan pyroxylin plastics as well as bone are used; in the United States pyroxylin plastics are used almost exclusively. Statistics from Japanese official sources show that Japan increased her exports of toothbrushes to the United States from 647,235 dozens, valued at \$190,713, or 29 cents per dozen, in 1913, the last full year before the war began, to 1,421,863 dozens, valued at \$444,736, or 31 cents per dozen, in 1916. The exports for the year 1913, however, were the smallest, both in quantity and value, in the 10-year period 1907-1916.

A leading manufacturer made the following statement relative to the toothbrush industry:

I think the United States is more than half the world's market for toothbrushes. When I was in England in 1914 one of the leading advertising agencies told me that if we wanted to introduce the brushes into the Kingdom we would first have to educate the people to use the brushes; less than 10 per cent of the population used toothbrushes. In France it was less. In Germany it was considerably more. (From the statement of Mr. William Cordes, of the Florence Manufacturing Co.)

Next to toothbrushes, hairbrushes are imported in greater quantities than any other kind of toilet brushes. The competition between the domestic and foreign-made hairbrush differs from that in toothbrushes. The cheaper grades of the foreign toothbrush have little or no competition in the domestic market, whereas competition between the foreign and domestic hairbrush is keenest in the cheaper and medium grades. This is due in large measure to the difference between methods of manufacture employed here and abroad. The American hairbrush is mainly machine made; that is, the tufts are set by machinery, or the bristles are sifted through holes in a die and afterwards embedded in a composition. The use of machinery permits a greater output per employee than the hand-drawn method, which is followed in Europe and Japan. The hand-drawn method has, apparently, been attempted in the United States, but it is not in general use because the wages paid in America are higher than in Europe or Japan, where the work is done for the most part in homes by women and children.

The firm of Gerts Lombard & Co., of Chicago, one of our best known and highest grade firms attempted to make what is known as the hand-drawn solid back brush—we call it solid back because it is not split but made of one piece of wood—and they have gone out of that particular industry. It is practically impossible to make those brushes. (Statement of Mr. H. Alexander.)

We can make them, but it is not practicable to do so profitably. (Statement of Mr. William Cordes.)

Domestic manufacturers claim that foreign-made brushes are largely the product of home work, but that claim is denied by representatives of foreign manufacturers.

It is a known fact that the hairbrushes, toothbrushes, and all other toilet brushes imported into this country are largely the product of home labor, and are mostly the work of women and children. Whole villages in France, Hungary, Saxony, and elsewhere are given over to this industry without sanitary regulations of any kind and without restrictions as to the hours of labor. This condition is greatly intensified in Japan, which is sending in more hair, tooth, and nail brushes to the United States than any European country, and which has but four large brush factories that we know of. * * * Toothbrushes in Japan are almost distinctly products of child labor. Contractors and middle men will distribute handles and bristles to women and children at their houses and call there at least once a week to gather in the made-up brushes, paying a very small sum for doing the work. (Statement of Mr. H. Alexander, of the Henry L. Hughes Co., manufacturer.)

There is no home production in connection with our factory (E. Dupont & Co.) in France. I think our factory is pretty nearly as large and as complete as any factory of its kind in the world. The sanitary conditions there I do not think could be improved upon. There is absolutely no work done outside of our factory. * * * Women and girls, from 16 to 17 years and older, but not children, are engaged in our factory. In fact, they are very strict about their schooling in France. (From the statement of Mr. F. E. O'Callaghan, importer.)

The only work that goes into the home (in France) is that of inserting the bristles into the brushes. The women are unable to leave their homes on account of domestic conditions, etc., and the consequence is the factory takes to them the material and when the work is completed collects it from them. So far as the shaping of the bones is concerned, polishing, washing the bristle and preparing it, all those articles are done in the factories, which are inspected regularly by the authorities to see that everything is perfectly clean and sanitary. (From the statement of Mr. Louis D'Angelo, of the Cauvigny Co., importers.)

Germany and Austria make use of automatic machinery in the production of hairbrushes. At present (1918) there is little competition in the high-grade brushes on account of the restricted importations from France and England. The French ivory hairbrush was much in vogue a few years ago and was instrumental in establishing the popularity of French-made brushes. Japan is now (1918) exporting greater quantities of hairbrushes to the United States than ever before. In 1913 Japanese exports of hairbrushes to the United States amounted to 165,476 dozen valued at \$292,007, or \$1.76 per dozen, and in 1916 to 261,063 dozen valued at \$451,344, or \$1.73 per dozen.

The following statement regarding competitive conditions was made by a representative of Japanese manufacturers:

I think it can be said without contradiction that the importers have lost the business in hairbrushes which retail at anything from 50 cents down. We have not been able to get any goods that would compare in service with the goods produced in this country. * * * In the cheaper grade of brushes, on account of competition with the American makers, it is not possible to put in pure stiff bristles and they (Japanese) use the cheap, soft bristles. They must put something else in to give it sufficient stiffness.

You do not find mixed bristles on the American market used by the American makers, and in that lies the difference in value between the American cheap hairbrush and the Japanese cheap brush. In a cheap hairbrush the public wants a good stiff pure bristle, and they do not care anything about the back. It is on that account that we have not been able to increase our business on cheap hairbrushes in this country. Those competitive conditions are recognized in the trade, and for that reason the American cheap brush sells better than the imported cheap brush. (From the statement of Mr. W. B. Gibson, importer.)

What has been said in regard to hairbrushes is also true of nail, bath, cloth, and hat brushes. These brushes can be made by machinery, and it is on the strength of the greater output per employee, as well as factory organization and selling methods, that the domestic producer can compete with the foreign hand-drawn method. Shaving brushes are imported only in small quantities; the competition is among domestic producers.

Paint and varnish brushes.—There is little foreign competition in the heavy lines of paint and varnish brushes. They represent only a small proportion of the total brushes imported. Before the war, Germany was about the only country that exported this class of goods to the United States. Paint and varnish brushes are now (1918) being offered to the American trade by Japanese representatives, but their brushes are said to be cheap and poorly constructed. Japanese workers are not skilled in the art of making paintbrushes and up to the present time American manufacturers have felt no competition.

The American paintbrush manufacturers have had all they could do right in their own country. We have not gone after the export trade to any great extent for the simple reason that our capacity has been limited owing to the scarcity of labor. We can not depend on any machine to produce our goods; we have to depend upon hand labor all the way through. * * * They (American manufacturers) tried to sell goods in South America, and they found the German product very strongly entrenched. * * * To-day a large percentage of the brushes used in those countries are either German, English, or French goods. * * * Heretofore there have been some few paint brushes imported from Germany, and it is said that Japan is now trying to catch the American production. I have seen several samples, and they are very crude compared to ours. The German product is mostly a soft hair brush. Some of the manufacturers make those lines but we do not. We do not meet any competition from abroad. (From the statement of Mr. George Barth, of the Bigelow Brush Co., manufacturers.)

Before the war we had made attempts to export goods, but the German competition was so severe, we never found it possible to do that profitably, and for that reason our line of exports has been very small. Another reason for the small amount of exports is the fact that the models of the German manufacturers were different from the American models, and we never discovered that there was enough profit in the German models to make it pay to copy them. (From the statement of Mr. J. H. Heroy, of Rennous, Kleinle & Co., manufacturers.)

The small imports of paintbrushes may be attributed partly to the difference in style between the American and foreign models, to the established reputation of the American brush, to the fact that the trades for various reasons prefer the American make, and to the nature of the brush itself, which is, perhaps, the chief reason. The materials used in the manufacture of the paintbrush enter largely into its value, and therefore the ad valorem duty is an effective protection.

Artists' brushes and hair pencils.—These brushes are made of soft hairs, and are used by artists, decorators, strippers, and letterers. The volume of production in the United States is small compared with the total production of all brushes. Some manufacturers of paint and varnish brushes handle artist's brushes as dealers, obtaining their stock from manufacturers who make a specialty of this line; others carry a line of imported artist's brushes. No machinery is used in the production of these brushes; they are made entirely by hand labor and much of the work is given out to be done in homes. Although the labor put in the American made article is less than in the foreign, the labor cost is relatively greater.

Some of this work is given out. The putting of the hair into the brush is often done outside, but the finishing of the goods, the extracting of the short hairs which are in every brush, etc., is all done in the factory.

There is a big field for that home work. We have in New York City, I will guarantee, 100,000 women who would like to do this work at home. I have picked up in a few weeks 100 extra hands in that way to make these cheap goods. I can not keep that up because the Japanese competition has spoiled my plans. These women would like to make the goods at home, because their housework only takes about half of their time, and a great many of them have absolutely no pin money whatever. If they can make \$5 or \$6 a week and only be employed half their time, they are very glad to do it. I think for my industry that is the greatest labor market in the world.

That work could not be done in New York State except through the granting of a license by the authorities. The authorities give licenses to any houses where the landlord allows the house to be investigated. The license is given to any house with three or four tenants; if it has less than three tenants no license is required. We have lots of houses licensed in Mulberry Street, right in the Italian district, where there will be anywhere from 12 to 20 families in a house. The landlords get a permit. (From the statement of Mr. A. Baker, manufacturer.)

Before the war 90 per cent of the importations came from Germany. Since German competition has been eliminated, this branch of the industry has had some prosperous years. The American manufac-

turer is not without foreign competition, however, as the Japanese have entered this field also. It is claimed that their brushes do not point up well and therefore are unsatisfactory. The Japanese have not as yet acquired the technical knowledge to become a serious competitor in the American market.

Before the war there was imported to the United States from Germany a very large quantity of soft hair brushes made of squirrel and similar hair. Few of this class of goods were made in the United States simply because they could be made much cheaper in Germany, owing to much lower labor costs. Since the imports from Germany ceased, some of the American manufacturers of soft hair goods have done a fairly profitable business, of course at a considerably higher price than before, as labor prices naturally were higher than those in Germany. Now you will find that Japanese manufacturers are offering these soft hair goods at prices below the actual cost price of the same goods made by American makers. (From the statement of Mr. William Cordes, of the Florence Manufacturing Co.)

In the last few months a good many of our styles have not been selling at all because Japanese competition has come in. Any large jobber can go to any Japanese importer, of which there are about 25 in this city, and that importer will send my sample to Japan, have it copied and they will produce it for less money than I can produce it myself. * * * I have no reason to believe that the goods are being shipped into this country at less than the cost of production abroad, because generally speaking, the Japanese price to-day is 20 per cent higher than the German price in normal times. I think it is legitimate, but I believe when times are normal the Japanese appetite will be so keen to keep this line of manufacture that she will undersell Germany. I do not think the German product was dumped on this country at an unreasonably low price, but the people in Germany seem to work so unreasonably cheap. (From the statement of Mr. A. Baker, manufacturer.)

American producers of household, shoe, horse, mill or machine brushes, and a great variety of special brushes, have little or no foreign competition. The small imports of these brushes are accounted for by the fact that some of the brushes can be made by machine, a method in which Americans excel, while others are of such peculiar shape and design that the demands of the trade can be more quickly supplied by the American manufacturer than by the importer, who is not apt to carry an extensive line of special brushes.

Imports.—The total value of the general imports of brushes of all kinds for the years 1910 to 1914, inclusive, averaged \$2,062,114. In 1915 the imports fell to \$1,644,189 and in 1916 to \$1,292,801, but rose in 1917 to \$2,209,976, the highest amount reached, with the exception of 1911 when the amount was \$2,241,066.

Previous to the war about two-thirds of the imports came from France, Germany, and England. The value of the imports from France and England has decreased more than one-half since 1914. The imports from Germany amounted to only \$1,305 in 1917 as against \$514,240 in 1914. The decline in imports from Austria-Hungary, although relatively large, has had little effect on the total

value imported, as the imports from that country have never been in excess of \$40,000.

The increase in the imports from Japan has more than offset the decline in imports from Europe. For the years 1910 to 1914, inclusive, the imports from Japan averaged about 30 per cent of the value of the total imports. In 1915 they amounted to \$757,421; in 1916 to \$843,020, and in 1917 to \$1,800,300. During these three years they formed 46, 65 and 81 per cent, respectively, of the total imports of brushes from all countries.

Exports.—Comparatively few brushes are exported from the United States. In 1914 the total domestic exports amounted to \$449,909, or less than 3 per cent of the total production for that year. Exports increased to \$604,916 in 1915, and to \$1,132,262 in 1916, but dropped in 1917 to \$863,630. The increase in 1916 was due to the large purchases made for the British Government. The exports to England were: \$27,213 in 1914; \$301,865 in 1915; \$621,104 in 1916; and \$70,038 in 1917. The decline in the value of brushes exported to England in 1917 was due directly to restrictions placed on shipments by the British Government.

In 1915 and 1916 our export trade in brushes with England was greater than with any other country; with this exception Canada has been the chief country to which the United States has exported brushes. In prewar times Canada took between 40 and 50 per cent of our exports; since 1914 her share has varied from 13 to 29 per cent, the variation being due partly to a decrease, in some years, in value of the exports to Canada and partly to relatively larger increases to other countries.

Exports to other specified countries for the years 1914 and 1917, respectively, were as follows: Cuba, \$31,717 and \$81,252; Mexico, \$17,640 and \$56,849; Argentina, \$10,561 and \$39,994; Australia, \$34,572 and \$47,307; Brazil, \$2,440 and \$29,666. The increase in the export trade is traceable to the war. Those countries which depended upon Germany, England, and France have now turned to the United States for their supply of brushes. Domestic manufacturers, have not as a rule, sought an export trade either before or since the war began. They look upon the increase as temporary and believe that Germany, England, and France, in order to regain their former trade, will sell brushes at prices so low that the American manufacturer will not be able to compete.

The kinds of brushes exported are not shown in official statistics but from other sources it is learned that our exports, especially those to Canada, are mainly paint and varnish brushes. Some of the large paint and varnish houses handle brushes as a side line in connection with their regular export and domestic trade. Toilet brushes are

also exported, but they are usually brushes with established trademarks.

Duties collected.—The revenue derived from the importation of brushes averaged \$625,000 for the fiscal years 1907 to 1909, inclusive; \$804,000 for the years 1910 to 1913, inclusive; and \$650,000 for the years 1914 to 1917, inclusive. The average for the last period was greatly affected by the war, which caused a large decrease in the value of the imports for the fiscal years 1915 and 1916, before the imports from Japan had offset the decrease from Europe. The first period was for the last three years under the Dingley tariff; the second period for four years under the Payne tariff; and the third period for four years under the Underwood tariff.

**THE MANUFACTURE OF BRUSHES IN THE
UNITED STATES.**

THE MANUFACTURE OF BRUSHES IN THE UNITED STATES.

The manufacture of brushes in New England began in the vicinity of Boston, and that locality has remained an important center of the industry in the United States. The historian of the town of Medfield, Mass., records: "In 1808 the manufacture of brushes commenced here and was a new industry in this section of the country." The brushes made in Medfield were an improvement over the English brushes and superseded them entirely during the War of 1812. The superiority of the American brushes was not, however, entirely responsible for the disappearance of the foreign product, as the war itself stopped all trade between the United States and England and gave American producers an opportunity to establish their goods in the American market. Brushes were also manufactured in Lansingburg, now part of Troy, N. Y., as early as 1810, and the industry continues to be an important one in that city.

Summary of the industry in the United States.—The latest official statistics of the production of brushes are contained in the Census of Manufactures, 1914. In that year the industry was carried on in 359 establishments with capital amounting to \$14,332,768. These establishments gave employment to 7,213 wage earners on the average during the year. The cost of materials was \$9,326,655 and the value of the products \$17,894,476. Massachusetts, with a product valued at \$3,910,000, was first in production, but was closely followed by New York with \$3,835,000. Other States with a product in excess of \$1,000,000 were Maryland, New Jersey, Ohio, Illinois, and Pennsylvania.

Data for the industry as a whole and for the different branches, as defined by the Bureau of the Census, are shown in the following condensed table:

Items.	Total.	Toilet.	Paint and varnish.	All other.
Number of establishments.....	359	41	45	273
Wage earners (average number).....	7,213	1,208	2,420	3,585
Capital (thousands).....	\$14,333	\$2,329	\$6,483	\$5,521
Wages (thousands).....	\$3,461	\$660	\$1,262	\$1,539
Cost of material (thousands).....	\$9,327	\$1,109	\$4,208	\$4,010
Value of product (thousands).....	\$17,894	¹ \$2,675	² \$7,303	³ \$7,916
Value added by manufacture (thousands).....	\$8,567	\$1,566	\$3,095	\$3,906

¹ Toilet brushes to the value of \$545,501 were made by paint and varnish and other brush manufacturers, and to the value of \$92,369 by manufacturers in other industries.

² Paint and varnish brushes to the value of \$42,500 were reported by the "toilet" and "all other" groups, and to the value of \$309,169 by establishments assigned to other classifications, principally "paints."

³ "All other" brushes to the value of \$260,884 were made by toilet and paint brush manufacturers, and to the value of \$685,399 by establishments in other classifications, principally "upholstering materials, not elsewhere specified," and brooms.

Present conditions and disturbances due to the war.—The domestic production of brushes has been greatly stimulated by the partial elimination of European competition, increased purchases by the United States Government for the use of the Army and Navy, larger orders from foreign countries whose trade was formerly supplied by Europe, and increased activities in other industries.

In the first year of the war the British Government and the French Government had commissioners in this country trying to buy brushes from the manufacturers to help them in equipping their armies. That condition might account for some increase in 1916. Since then they have taken care of the situation themselves and are supplying their market. * * *

The war has had the effect of increasing our production. I think, in our particular case, it is due to the fact that there are no goods coming from foreign countries. We do not expect to hold the business we are doing now after the war is over, by any means. (From the statement of Mr. William Cordes, of the Florence Manufacturing Co.)

The demand in this country has been very heavy because of our entry into the war. We have had very large requisitions from the Navy and the Army in all the different departments, so that we have had difficulty in getting enough material to supply the needs of our own Government. (From the statement of Mr. J. H. Heroy, of Rennous, Kleinle & Co.)

The value of the general imports of brushes from European countries fell from about \$1,500,000 in 1914 to about \$400,000 in 1917, a decrease of approximately 70 per cent. Domestic exports were valued at \$863,630 in 1917, as compared with \$449,909 in 1914, an increase of 91.9 per cent. Brush machinery that was idle prior to the war is now (May, 1918) in operation, and manufacturers are installing new equipment and increasing the number of employees, as far as possible, to meet the demands of the domestic and foreign trade. The decrease in imports from Europe was more than offset by the increase in imports from Japan—an advance from \$665,952 in 1914 to \$1,800,300 in 1917, or an increase of 170 per cent.

The most serious disturbance in the brush industry, created by the war, is the shortage of bristles. Conditions in Russia and the uncertainty of shipments have caused a scarcity of Russian bristles and an advance in price since 1914 of 100 to 300 per cent. Some grades can not be obtained at any price; French and German bleached bristles are no longer on the market. The Chinese supply has been heavily drawn upon because of the scarcity of the Russian stock. Manufacturers are also resorting to bristles from India, commonly called Calcuttas. These have also advanced in price, but not to the same extent as the Russian bristles.

The war has made it very difficult to obtain bristles. There are two reasons for that. One is the fact that a great deal of our bristles came from Russia, and the system of transportation from Russia has been very much interfered with; Russia's commercial life has been altogether interrupted, and at the present time we know of no bristle coming out of Russia. The only bristle to be had is the bristle that has already come out of the country. The other source of supply is China, and that

supply has been drawn on very heavily because of the scarcity of the Russian stock. The difficulty in the case of the Chinese bristle is the difficulty in getting bottoms in which to bring the material over. (From the statement of Mr. J. H. Heroy, of Rennous, Kleinle & Co., manufacturers.)

Russian bristle is very scarce at this time, and of course the price is very much increased. Bristle is bought according to length, and the price is fixed on each length according to the demand. On some black goods to-day you can buy 3 $\frac{3}{4}$ -inch bristle, for instance, just 5 cents a pound cheaper than you can buy the 4-inch. That is, perhaps, on account of the scarcity of 4-inch. It depends on how stocks are in this country. Since the beginning of the war prices have advanced on the Chinese goods 75 per cent, I should say offhand. On the Russian goods they have more than doubled; they have trebled in some cases. (From the statement of Mr. G. Barth, of the Bigelow Brush Co., manufacturers.)

The increase in price of Chinese bristles and Calcuttas is indicated by the following table, which gives the price per pound at which specified bristles were sold at auction in London, in October, 1915, 1916, and 1917:¹

Year.	Chinese bristles.		Calcuttas.	
	Tientsin, 4 $\frac{1}{2}$ inches.	Chunking, 4 $\frac{1}{2}$ inches.	White, 4 $\frac{1}{4}$ to 4 $\frac{3}{4}$ inches.	Black, 4 $\frac{1}{4}$ to 4 $\frac{3}{4}$ inches.
1915.....	\$1.18	\$1.62	\$2.12	\$1.62
1916.....	1.60	2.05	3.41	1.89
1917.....	2.45	2.74	5.47	2.74

Celluloid has advanced in price on the average 85 per cent, horse-hair 50 per cent, brass wire 140 per cent, iron wire 50 per cent, and other materials in varying proportions since 1914. At times manufacturers have had difficulty in obtaining materials on account of freight conditions and the inability of producers of brush materials to supply the demands of the trade.

Wages have increased on the average 25 per cent since 1914. Although there has been no general increase in wages by collective bargaining on the part of employees, manufacturers have increased the wages of individuals and of groups of wage earners, in order to retain their present force as well as to induce labor to seek employment in their factories. The scarcity of labor is attributed to the draft and to the high wages paid by manufacturers engaged in the production of war supplies. Under this handicap, manufacturers have not been able to increase their output to the extent that the present demand for brushes would justify.

The custom of putting out work to be done in the homes of employees is decreasing, and is confined principally to the drawing of bristles into the backs or handles by hand. The state laws of New York require that tenement houses in which goods are made shall be licensed, and that goods made in homes shall be so marked. Laws

¹ Brushmaking, November, 1917, London.

regulating the hours of labor, employment of minors, sanitation, and minimum wages have improved the working conditions of the industry.

RAW MATERIALS AND THEIR ORIGIN.

Bristles.—Bristles obtained from the hog are the principal raw material used in brush manufacture. A feature of the bristle which especially adapts it to the manufacture of paint brushes is the "flag" or split end. This tiny split or division into several parts of the outer end makes it a perfect paint and varnish smoother and distributor. The flag end has no value to makers of toilet brushes. Another peculiar feature of bristles is the "bend" or natural curve, which must be taken into consideration in making paint, varnish, and other brushes of like character. The best grades of bristles, determined by length, color, stiffness, shape, texture, and resiliency, are obtained from hogs living in cold climates; hence Russian and Siberian bristles are known for their superior quality. Russia and China supply most of the bristles used in the brush industry. Russia is first in production, followed in the order named by China, Germany, and India. France produces a limited quantity of fine white bristles. The French have the best process of bleaching bristles; "French bleached" stands for the highest grade of whiteness. Other countries of central Europe produce and export considerable quantities of bristles. Those produced in the United States are a by-product of the slaughterhouses. They are short and inferior in quality on account of the breeding of the hog and its immaturity when slaughtered. American bristles are used principally in the manufacture of the cheaper grades of brushes, such as shoe and dust brushes.

The introduction of Chinese bristles into the American market was an important event in the brush industry. The objections of the trade to the substitution of Chinese for Russian bristles were largely overcome by the discovery of the proper treatment of the Chinese bristle. The chief obstacle to the use of the last named was the fact that its peculiar characteristics necessitated a method of treatment different from that used in preparing the Russian bristle. Chinese bristles are generally black and range in length from $2\frac{1}{2}$ to 7 inches. They are as resilient as the Russian, but are not so tough or so durable. Their hard-polished surfaces are undesirable in brushes.

Bristle markets.—The chief center of Russian bristles before the war was Leipzig, Germany. The German bristle houses sent their agents throughout Russia and Siberia, chiefly to Nizhni Novgorod, where fairs were held and to which place came the caravans carrying, among other articles to be sold, the bristles procured from the Russian farmers. The raw bristles were dispatched in bulk to Leipzig,

where they were sorted, roughly cleaned, bundled, and prepared for further distribution. The chief centers of distribution of Chinese bristles are Tientsin, Shanghai, Hongkong, and Hankow. Before the revolution in Russia, bristle dealers were endeavoring to divert the course of trade from Leipzig to some center in Russia, so that after the war Russian firms might secure the profits which would otherwise go to German middlemen. London at present (1918) controls the bristle trade. The Japanese are endeavoring to secure control of the Russian bristle market, and are said to have copied the effective German system of the past. The main source of supply of Siberian bristles is in the district bordered by the Urals on the west and the river Lena on the east. The question now arises as to whether, should the Japanese extend their sphere of influence westward, the market in the future would not be centered in Kobe. The control of the Chinese bristle trade is also being sought by the Japanese, but has thus far been prevented by the strength of British merchants in China.

Japan is getting a pretty strong hold on the bristle market and is endeavoring to control it. We have bought bristles within the last year from Japan, through a Japanese representative, which we never thought of doing heretofore. It is the first time in the history of our business, extending over a period of 50 years, that we have bought bristles direct through Japanese representatives. (From the statement of Mr. William Cordes, of the Florence Manufacturing Co.)

The following tables show the importation of bristles into the United States, by countries, for the years 1910 to 1917, inclusive:

Imports of bristles, sorted, bunched, or prepared, into the United States, 1910-1917.

Imported from—	1910		1911		1912		1913	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany.....	925,616	\$1,104,618	766,568	\$955,501	724,602	\$973,858	797,315	\$1,151,506
United Kingdom....	1,046,565	917,040	1,001,711	970,917	943,393	968,638	1,050,551	1,169,515
China.....	1,682,596	817,870	1,460,306	769,811	1,464,043	855,966	1,407,131	904,065
France.....	258,613	191,919	243,127	193,160	191,726	147,719	193,839	170,104
Russia in Europe....	37,948	51,063	37,273	51,867	15,894	26,701	32,321	43,542
All other.....	41,182	29,362	33,928	29,225	96,143	59,349	78,276	53,248
Total.....	3,992,520	3,111,872	3,542,913	2,970,481	3,435,801	3,032,231	3,559,433	3,491,980

Imported from—	1914		1915		1916		1917	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany.....	598,847	\$809,879	360,340	\$590,683	41,713	\$85,345	2,723	\$7,416
United Kingdom....	1,013,765	1,166,799	989,050	1,145,018	1,016,587	1,322,984	1,233,195	2,123,612
China.....	1,410,373	934,211	2,358,772	1,612,574	2,333,437	1,598,445	2,373,758	1,718,548
France.....	175,986	120,911	137,184	111,055	120,114	106,739	91,706	88,437
Russia in Europe....	7,450	9,341	39,770	69,568	180,413	354,199	124,389	255,255
All other.....	202,375	129,833	131,478	80,850	157,823	144,340	200,768	188,143
Total.....	3,408,796	3,170,974	4,016,594	3,609,748	3,850,087	3,612,052	4,026,539	4,381,411

Imports of bristles, not sorted, bunched or prepared, into the United States, 1910-1917.

Imported from—	1910		1911		1912		1913	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany.....	5,813	\$4,459	5,610	\$4,493	8,895	\$5,117	5,209	\$3,851
Russia in Europe....	4,318	3,575	5,759	5,144	4,958	3,897	8,210	6,308
United Kingdom.....	3,946	4,201	73	92	1,104	1,659	600	661
China.....					7,333	3,790	2,666	1,259
Denmark.....								
Sweden.....								
Canada.....			120	74			2,325	467
All other.....	23,850	752			3,884	333	141	37
Total.....	37,927	12,987	11,562	9,803	26,174	14,796	19,151	12,583

Imported from—	1914		1915		1916		1917	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Germany.....	14,287	\$15,317						
Russia in Europe....	12,578	9,881					25,543	\$23,146
United Kingdom.....			1,115	\$1,139	2,006	\$462	31,252	14,945
China.....	200	100			4,000	826	11,071	9,259
Denmark.....			10,409	1,045	44,440	2,409		
Sweden.....					7,895	9,096		
Canada.....	184	18	33,942	1,152	28,002	2,186	60,203	4,816
All other.....	1,110	179			31	11	1,391	370
Total.....	28,359	25,495	45,466	3,336	86,374	14,990	129,460	52,536

Substitutes for bristles.—No satisfactory substitute for bristles has yet been found. In the cheaper paintbrushes, horsehair and a fiber known as tampico are mixed with bristles, but they merely serve to increase the size of the brush at the expense of its quality. Their presence in some brushes is not easily detected except by those familiar with the industry. In hairbrushes and in some other toilet brushes, split quills are also used to cheapen the quality.

Hairs.—Some brushes are made entirely of hair. Horsehair is flabby, lacks the toughness, strength, spring, and wearing quality of bristles, and, what is very important to paintbrush manufacturers, the absorbing or paint-holding power of bristles. Horsehair is imported from England, Argentina, Italy, Russia, Brazil, Germany, and Uruguay. The domestic supply is from Texas. Red sable hair, a product of Siberia, is the most valuable hair put into brushes. It possesses fineness, toughness, elasticity, soft ends, and great durability. Brushes made of red sable hair are used by artists in miniature painting and in other fine work. Black sable hair serves for brushes used by sign writers and decorators, for lettering, striping, and scrollwork. Squirrel hair, designated camel hair; is fine and has soft ends; it is used largely in the manufacture of brushes for water-color painting. The real camel's hair is a Manchurian product. Skunk hair, dignified by the name of fitch hair, is used in large quantities for varnish brushes. It possesses elasticity and toughness, but lacks softness in the ends. Ox hair and bear hair are also largely used in making varnish brushes. Badger hair, which is

long, tough, and coarse, is frequently used for shaving brushes. Hair of other animals is also used in brush manufacture.

Vegetable fibers.—Vegetable fibers, obtained from palms growing in tropical countries, are largely superseding bristles in the manufacture of the coarser kinds of brushes. Tampico, the principal fiber used in brush making, is imported from Mexico and to some extent from South America. It is very coarse and is much cheaper than bristles or horsehair, but it does not possess the wearing qualities of either hair or bristles. It is entirely too coarse for paintbrushes, but is adapted to cheap floor sweeps, counter dusters, and other brushes for cleaning purposes.

Tampico is not easily distinguished from bristle and some bristle dressers have not hesitated to insert a first-class quality of the fiber in their packages of bristle. (From the statement of Mr. W. C. Howard, manufacturer.)

Bone.—Bone, used for backs or handles of toothbrushes, is one of the by-products of the large meat-packing houses in North and South America. The better grade toothbrushes are made from selected thigh bones of cattle. Buttock and shin bones are used for the cheaper grades. Bone handles, shaped, polished, drilled, and ready to have the bristles inserted are being offered in the American market by Japanese manufacturers at a price less than cost to American producers, notwithstanding the fact that the bone is shipped from Chicago to Japan and thence back to the United States, the Japanese paying the same price, f. o. b. Chicago. It is represented that a large proportion of the toothbrushes used in the United States have solid-back, bone handles. These brushes are largely imported from France and Japan. The bone brushes produced in the United States are wire drawn, with channels on the back filled with wax. Machinery has not been employed effectively in the United States in the manufacture of toothbrushes with bone handles.

Under normal conditions we have been able to buy the handle of the brush we make—when we made it of bone—in Japan at 27 per cent less than we could make it in our own factory, and the raw material, the bone from which the handle of the brush was produced, was shipped from this country to Japan. It is entirely a question of labor, because they can not buy bone any cheaper than we can buy it. * * * We are making toothbrushes by machinery, and we can do it as long as we can use pyroxylin. We can not make them by machinery with bone. The Germans claim that they have been successful in making them with bone, and we have a sample of a bone brush made on a machine. (From the statement of Mr. W. Cordes, of the Florence Manufacturing Co.)

Pyroxylin plastics.—These plastics are variously known by the trade names of celluloid, pyralin, fiberloid, and viscoloid. They consist of pyroxylin—a variety of nitrocellulose—and camphor, with or without a pigment, which is usually zinc oxide. The addition of the pigment gives the opaque product; any desired color may be produced by the addition of suitable dyes. The resemblance of

some of these plastics to ivory, in texture and color, has made them very popular materials for the backs of toilet brushes, especially those in sets. Toothbrush handles of plastics are rapidly replacing those made of bone. They are not so porous as bone and for that reason are more sanitary; they will not split and lacerate the gums; they can be used more successfully than bone in making brushes by machinery, as bone splits in the process of drilling; also the metal staple or anchor used to fasten the tuft in the handle or back can be more firmly embedded when plastics are used. Possible rival commodities of the pyroxylin plastics are those of the synthetic phenolic resin type, variously known by the trade names of bakelite, condensite, and redmanol.

Wood.—Wood used in the backs or handles is generally of the hardwood variety imported from tropical countries. Birch, beech maple, and cherry from New York and the New England States, and redwood from California are also used. Some manufacturers buy the wooden handles or backs ready-made; others cut them from the log or lumber in their own factories.

Adhesives.—In the manufacture of simple brushes and in some compound brushes, adhesives are used to secure the bristles. Brushes are set in a composition of shellac, pitch and other gums, in cement, and in glue, the adhesive depending upon the ordinary use for which the brush is intended. A departure from these setting mediums was the use of vulcanized rubber. Hard rubber is insoluble in almost anything in which bristles can be used, whereas other adhesives are more or less susceptible to the action of various liquids.

Miscellaneous materials.—The materials used for binding the bristles to the back or handle are twine, wire, leather and ferrules of iron, steel, tin, and brass. Other materials which become part of the finished brush are tacks, screws, nails, paint, and varnish.

METHODS AND PROCESSES OF MANUFACTURE.

In the United States brush making started as a household or neighborhood industry. Power machines and other labor-saving devices are now replacing hand labor. This evolution has been slower in the brush-making industry than in most others, notably the textile. There are, however, operations which do not readily lend themselves to the use of automatic machinery. The use of automatic machinery is confined to bristle combing and mixing, to nailing in the manufacture of simple brushes, and to boring and tuft setting by means of staples or anchors in the manufacture of compound brushes.

In the production and manufacture of paintbrushes skilled labor is absolutely required. We have no machines to put the brushes together. The only machines used in our manufacture are what we call the bristle mixing machines and the nailing machine. Aside from those things everything else is done by hand. Some people may be under the impression that it does not require any skill to make a paintbrush.

We would not attempt to put a man on certain brushes unless he had had at least three or four years' experience at the bench, for the reason that if the bristle was not turned in, if what we call the flag ends were not turned in, in the proper shape, so that when it is put into the material it will work and wear like a chisel, instead of spraddling out like a painter's duster, the brush would not be any good. (From the statement of Mr. G. Barth, of the Bigelow Brush Co., manufacturers.)

The article is entirely too delicate for machine production. One of those little tufts of hair is so delicate that the average person would not know that they had it in their fingers. He could not control it and could not work it into shape. To learn how to make brushes properly a person should start in his youth. The hair is produced from the tails of various animals, squirrels, marten, mink, and so forth. It is only after a person has got used to feeling the hair with the fingers, knowing how much he has and how much it varies in length and so forth, that he can make a good brush. (From the statement of Mr. A. Baker, manufacturer.)

Brushes are simple when they have a single tuft of bristles or hair, as paint, varnish, and shaving brushes, and compound when they have a multiplicity of bristle or fiber tufts, as hair, tooth, nail, hat, cloth, shoe, and scrub brushes.

Brushes may also be divided according to their use into three classes: (1) Brushes for toilet purposes, as hair, tooth, nail, bath, and shaving; (2) brushes for painters and artists; (3) brushes for cleaning and polishing, as shoe, scrub, stove, and the great variety of special brushes which come under this class.

SIMPLE BRUSHES—PAINT AND VARNISH.

Preparation of bristles.—Although bristles are generally bought graded as to length and roughly cleaned, they are put through a number of processes before they can be used in brushes. They are further graded as to length by a process called dragging, are washed, dried in a kiln, wrapped around wooden plugs to straighten the bend, and in case of light stock are bleached. These operations are performed by hand. The bristles are then combed and mixed for stock, generally by machinery; the mixture depends upon the grade and kind of brush to be made. The tangles are removed by combing, and all the flag ends are placed one way. The cost of production is reduced by mixing bristles of different quality and varied lengths. The mixing of different lengths is a real advantage, because it permits new flag ends to be brought into use as the longer bristles wear out, and because it prevents the brush from wearing stubby.

Brush making.—This operation may be said to be first in the manufacture of paint and varnish brushes. The stock that goes into each brush is weighed by the brush maker on a hand scale. The required amount of stock is then taken up to be made into a brush. It is here that the skill of the brush maker comes into play. Notwithstanding previous treatment of bristles to remove the bend, they still retain this feature. The brush maker, by a few movements of the hands, so arranges the bristles that the natural bend is inward, toward

the center of the brush. If the bend is not properly arranged, the bristles will spread and the brush will prove unsatisfactory to the user.

Metal-bound flat brushes.—The brush maker, after arranging the bristles, inserts them in a metal band, which protrudes some distance above the butt ends of the bristles. If the brush is not made solid, wooden plugs or strips are inserted as a filler and to secure the bristles more firmly in the metal band.

Metal-bound round and oval brushes.—The brush maker, in addition to arranging the bristles and inserting them in a ferrule, pushes the handle backward through the center of the tuft, small end first, and then drives it into place by the hard blows of a hammer.

Chisel-pointed brushes.—The flag end of the tuft is put into a cup, wedge-shaped at the bottom, as large as the brush to be made. By tapping and gentle pressure the tuft settles down into the cup, from which it is removed in the desired shape, and is placed in the binder.

Leather-bound brushes.—The bristles are distributed around the handle or block. The brush maker, by his sense of touch, always keeps the bend of the bristle inward and toward the center. In place of a metal ferrule as a binder, a strap of leather is drawn tightly around and nailed to the handle by hand.

Brushes set in vulcanized rubber.—The operations are somewhat different. The tufts are partly secured by the application of unvulcanized rubber before being placed in the bands or ferrules. Owing to the hardness of rubber after vulcanization, it is necessary to drill holes in that portion of the brush in the band or ferrule before the brush can be nailed.

Applying adhesives.—The adhesive, if cement, is poured into the open end of the metal band over the butt end of the bristles, or it is driven in by a machine operated by compressed air; if vulcanized rubber, the unvulcanized gum is applied to the butt end of the tuft, which is then placed in a kiln to evaporate the benzine or other solvent. After the tuft has been placed in a band or ferrule the brush is ready for vulcanization, the time for which varies according to the character of the work.

Other operations.—Handles are inserted in the ferrules or bands, are nailed into place either by hand or by a power-driven machine, and the loose bristles are eliminated and the brushes trimmed. The brushes are then moistened, wrapped in paper, and placed in a kiln, in order to give the correct position to the bristle. Names or brands are stamped on the handles, which are then varnished or painted by hand, or the brushes are placed in racks and the handles then dipped in varnish or shellac. When dry the brushes are inspected, the bristle end is papered to maintain the shape, and the brushes are placed in boxes for shipment.

COMPOUND BRUSHES.

Hair, tooth, cloth, hat, shoe, and other brushes containing a multiplicity of tufts are subject to similar methods of manufacture.

Preparation of bristles.—Bristles are received in bunches, ranging in diameter from 2 to 12 inches. Before they can be used in the manufacture of brushes, they must be inspected, washed, sterilized, bleached, combed, dragged, cut into proper lengths, mixed, bunched, and weighed.

Preparation of backs or handles.—When wood is used, it is cut into slabs of approximately the length, width, and depth of the brush backs. The slabs are then roughly shaped and planed before being sent to the shaper, who by the use of rapidly revolving knives gives them their final form. The sand wheeler removes the rough edges and smooths the backs, which are then sent to the finishing room, where they are subjected to various processes to give them the desired finish. Holes are drilled in the backs or handles, except in the so-called rubber-cushion and composition-face brushes, the backs of which are routed—that is, hollowed out. If bone is used for the backs and handles, the operations vary according to the grade and quality of the brush to be made. The usual operations are the sawing of the thigh bones into slabs, which are in turn milled to the thickness desired, shaped, drilled, bleached, polished, weighed or counted, and inspected. If pyroxylin plastics are used, the blanks are put through various processes of shaping, drilling, polishing, and inspecting, the number of operations varying in different establishments as well as in the grade of the brush to be made.

Hand-drawn, veneered, or two-piece brushes.—The oldest known method is that employed in making a veneered or two-piece hand-drawn brush. It is distinctly handwork. The wooden block already shaped into a brush back, flat on top and containing the required number of holes, is sent to the drawer, who passes a loop of fine wire or thread through one of the holes from the back of the block and inserts the proper amount of bristles in the loop. By drawing the wire or thread tight, the tuft is bent double and pulled into the hole. The process is repeated until all the holes in the block are filled. Backs are then fastened to the blocks containing the rows of tufts, either with glue or screws and sometimes both. This method of making a brush is employed more extensively in Japan and in the countries of Europe where labor is cheap, than in the United States. Wherever brushes are made by the hand method, the drawing is done to a very great extent in the homes of the employees, by women and children.

Machine-drawn brushes.—This process is more manual than mechanical. The machine measures correctly the quantity of bristles and marks their center, thereby facilitating the manipulation of the wire.

The operator proceeds in much the same way as in hand drawing, the principal difference being that the bristles are measured and centered by machine instead of by hand. The use of the machine insures smaller wastage.

Handmade, trepanned, solid-back brushes.—The solid-back brush, as its name indicates, consists of one piece only. Vertical holes are bored halfway through the brush block, where they intercept longitudinal channels extending from end to end. A block so prepared is said to be trepanned. Threads are inserted into the channels and drawn up through the vertical holes to the surface by means of a fine hook. The tuft is then placed in the loop and when the thread is drawn taut, the tuft is forced into the hole. The process is repeated until every hole is filled. The ends of the longitudinal channels are plugged to secure the threads. The drawing, like that of the two-piece brush, is done almost exclusively in the homes of employees. This process is much in vogue in France and in Japan and to a less extent in England, Germany, and Austria in the manufacture of hair, tooth, nail, and cloth brushes. Manufacturers in the United States do not follow this method extensively, as labor conditions are against it. Brushes are sometimes made to have the appearance of being trepanned by the insertion of plugs in holes at the end of the brush.

Staple or anchor fastened, solid-back brushes.—Brushes made by this process are more properly designated solid-back brushes than the trepanned brushes, because there are no longitudinal channels but only the holes in which the tufts are secured. An automatic machine has been perfected which measures the bristles, bores the holes, inserts the tuft in the hole and secures it there by means of a wire staple or small steel anchor. This method is used extensively in the United States in the manufacture of hair, tooth, and other toilet brushes. The use of automatic machinery, however, is not confined to the industry in the United States; in fact the automatic tooth-brush machine was invented in Austria, and the automatic machine for making hair brushes is the product of French or Belgian ingenuity. Germany and Austria have manufactured machine-made brushes for many years. Some of the choicest tooth brushes with celluloid handles which come from Austria are machine made. Brush makers in Japan are keenly alive to the exigencies of the situation and are installing or making preparations to install automatic machinery, either imported or copied. It is claimed that the Japanese brush makers, having the advantage of cheap labor, will be able to place brushes on the market at a price below the range of possibility to American manufacturers. However, those who are familiar with conditions in Japan state that the Japanese worker does not readily adapt himself to factory regulations, and for this reason his output per machine is not equal to that of workers in other countries.

The Japanese workman is not frivolous, but he is not yet trained to our ideals of factory workmen; that is to say, to working steady hours, to working constantly, and being willing to perform the same operation time after time throughout the day. The Japanese workman prefers a little variety in his work, and that is why he excels in carving, in painting, and in things of that kind, where he can put a little originality into the production. His natural traits are so strongly opposed to methodical work that it is impossible to put him on machines and get any kind of results. We have tried machine drawing and it does not pay. The amount of bad workmanship is more than enough to make up for the increase in speed. For that reason we continue the hand drawing and will probably do so until the nation develops characteristics which will make them good, efficient, work people. This condition has always jeopardized their industrial future and always will. (From the statement of Mr. W. B. Gibson, importer.)

The use of machinery has shut out labor to some extent. When those brushes (toothbrushes) were drawn by hand a good many of them were made in the homes of people and drawn by them, and that has been eliminated entirely.

About 10 years ago we bought the United States rights to the Gruneberg (Austria) machine, which we still hold. The machine we are now using is not the Gruneberg machine. It is our own. There has been an absolute change in the machine, embodying not only the Gruneberg patents, but also the McClintock-Young patents. I do not know if these automatic machines are used in Japan. Mr. Gruneberg is operating his machine in his own factory in Austria, and his brushes are shipped to this country to some extent. One brush, known as the Kleanwell, is a Gruneberg product. That is the celluloid end of it, and the others are bought in France, or wherever the importer can get them. I do not think that there is a greater use of automatic machinery here than abroad, except in our particular line. I think there are very few machines used in the making of other brushes. (From the statement of Mr. William Cordes, of the Florence Manufacturing Co.)

Composition-face brushes.—The composition-face brush is the result of modern tendencies to produce on a large scale and at low costs. It is an original American process. The brush block is routed; that is, the under side is hollowed out and filled with a plastic composition. Bristles are shaken or sifted by means of an agitator through the holes of a die or pattern. The tufts are forced into the composition which, when hard, firmly holds them in their proper places.

Rubber cushion brushes.—In rubber cushion brushes the blocks are routed and undercut. The bristles are sifted by an agitator through the holes of a piece of rubber somewhat larger than the recess of the block. The ends of the bristles protruding through the rubber are ironed down, and liquid rubber is placed over the ironed ends and vulcanized. The rubber containing the tufts is inserted in the back of the brush. A hole is bored in the end of the brush to allow the passage of air under the rubber to give the cushion effect. Hair-brushes are made by this process both in the United States and in England.

Cement-set brushes.—By this method the tufts are secured in the backs of brushes by placing the proper amount of cement in the holes and afterwards inserting the tufts by hand. The method is simple,

yet its successful application may be said to be confined, in the United States, to one establishment. On account of the greater labor cost involved, brushes made by this process are generally the high-priced articles.

Pitch-set brushes.—In this method, sometimes called panwork because the workers sit around a pan of melted pitch, one end of each tuft is dipped in melted pitch and bound with thread. The tufts are then redipped and inserted with a twisting motion into the holes of the handle or back. Counter dusters, floor sweeps, and blacking brushes are among those made by this method.

The foregoing are methods used in the manufacture of multiple tuft brushes. No attempt has been made to describe each single operation in the manufacture of a brush; only general methods have been dealt with. The number of operations is determined not only by the grade of the brush but by the policy of the company in regard to the division of labor. As an illustration of the number of operations in making a tooth brush, one manufacturer reports that there are about 40 operations in making a toothbrush with a bone handle and about 30 for one with a celluloid handle. These operations include the forming and finishing of the handles, inserting the tufts, serrating and shaping of tufts, stamping or printing of names and trade-marks on the handles, inspecting the work at various stages, counting or weighing brushes, grading, sterilizing, and boxing and assembling for shipment; in fact, all operations except the preparation of the bristles.

**REVIEW OF THE INDUSTRY AND TRADE IN
PRINCIPAL FOREIGN BRUSH-PRODUCING
COUNTRIES.**

REVIEW OF THE INDUSTRY AND TRADE IN PRINCIPAL FOREIGN BRUSH-PRODUCING COUNTRIES.

Brush making in the various countries of Europe is relatively a small industry, and only meager descriptions of industrial conditions are to be found. Apparently the American consuls have not been called upon to make special reports on this industry, as an examination of their reports discloses very little information in regard to the manufacture of brushes. Statistics of production are not published by European nations as a rule; England had its first census of production in 1907.

FRANCE.

The manufacture of brushes was carried on mainly in that part of France, now (winter of 1917-18) occupied by the Germans. The French product consists largely of hair and tooth brushes, and is noted for its graceful and artistic design as well as for its fine quality. The bristles used in the manufacture of brushes are imported from Russia and Roumania. Before the war France also secured bristles from Leipzig. France, however, produces a very fine quality of white bristles. The French possess a superior method of bleaching, and the bristles so treated are much in demand for the manufacture of the better grades of brushes.

In the manufacture of toilet brushes, France follows principally the handdrawn trepanned method. Much of the drawing is done in homes by women, when not occupied with their household duties, and by children after school hours. Whole villages are engaged in the production of brushes. The contractor delivers the materials to the workers at their homes and afterwards calls for the finished product. In a review of the trade and industrial conditions for the year 1915, Consul General A. M. Thackara, Paris, says:

The French manufacturer has realized that too much of the work in the manufacture of brushes has been done by hand. Already steps are being taken to change the methods of production by the introduction of machinery after the war.

Imports and exports.—In normal times France does not import many brushes. In the period covered by the years 1909 to 1914, inclusive, the imports varied from \$57,572 to \$108,749, without showing any steady trend either to increase or decrease. The maximum for the period was reached in 1913, but the following years the imports fell to \$68,845. The brushes imported by France were principally from Belgium and Germany. From 1909 to 1912,

inclusive, the former country supplied between 40 and 47 per cent of the imports, and in the years 1913 and 1914 Germany took first rank in supplying slightly more than 40 per cent of the total imports. France also imports brushes from the United States. The highest amount credited to the United States was in 1911, when the imports amounted to \$6,747, or 8.9 per cent, of the total imports of brushes.

The production of brushes in France is in excess of the consumption; she is, therefore, to be classed as an exporting country. The total value of the exports for the period 1909 to 1914 varied from \$1,149,905 in 1909 to \$2,482,193 in 1913. The exports amounted to \$1,832,583 in 1914, up to which time there was a gradual increase. England has taken from 26 to 35 per cent of the French exports, Belgium from 8 to 18 per cent, United States from 10 to 20 per cent, Argentina from 6 to 10 per cent, Germany from 3 to 5 per cent, and the French colonies from 6 to 11 per cent. The exports to the United States, which in 1909 amounted to \$113,506, jumped to \$219,450 in 1910 and gradually increased up to 1913, when another large increase was shown, the exports amounting to \$435,456 although the quantity exported in 1913 was less than in 1912. This increase in value was due to a change by the French Government in the official value placed on brushes exported. In 1914 the exports dropped to \$277,775. It is interesting to note that a comparison of the French official statistics of exports of brushes with the United States official statistics of imports shows a wide variation between the two statements of the value of brushes exported by France to the United States. The difference is explained by the methods followed by these governments in valuing the same goods. The French place an official value upon exports, which for brushes was 472 francs per quintal or 100 kilos, for the years 1909 to 1912, inclusive, and 950 francs per quintal for the years 1913 and 1914, whereas the imports into the United States are valued at their actual market value or wholesale price, at the time of exportation to the United States, in the principal markets of the country whence exported. French statistics cover the calendar year, whereas those of the United States are for its fiscal year, another fact to be taken into consideration in comparing the exports of France with the imports of the United States.

The following tables show French imports from, and exports to, principal countries, for the years 1909 to 1914, inclusive:

Imports of brushes into France, 1909-1914.

Imported from—	1909		1910		1911	
	Value.	Per cent of total value.	Value.	Per cent of total value.	Value.	Per cent of total value.
Germany.....	\$16,428	28.54	\$22,002	32.36	\$23,836	31.44
Belgium.....	24,569	42.68	29,776	43.80	31,463	41.49
United States.....	6,454	11.21	.....	.....	6,747	8.89
All other.....	10,121	17.57	16,208	23.84	13,787	18.18
Total.....	57,572	100	67,986	100	75,833	100

Imported from—	1912		1913		1914	
	Value.	Per cent of total value.	Value.	Per cent of total value.	Value.	Per cent of total value.
Germany.....	\$23,909	30.24	\$41,512	40.32	\$28,012	40.69
Belgium.....	36,597	46.29	38,725	35.08	22,919	33.29
United States.....	5,794	7.33	6,496	5.89	5,796	8.42
All other.....	12,761	16.14	20,657	18.71	12,118	17.60
Total.....	79,061	100	110,390	100	68,845	100

Exports of brushes from France, 1909-1914.

Exported to—	1909		1910		1911	
	Value.	Per cent of total value.	Value.	Per cent of total value.	Value.	Per cent of total value.
United Kingdom.....	\$359,829	31.29	\$368,939	28.65	\$349,171	27.63
Belgium.....	206,241	17.94	205,057	15.93	203,053	16.07
United States.....	113,506	9.87	219,450	17.04	224,096	17.74
Germany.....	56,115	4.88	48,281	3.75	49,830	3.94
French colonies.....	92,918	8.08	96,015	7.46	117,696	9.32
Argentina.....	114,690	9.97	93,373	7.25	91,369	7.23
All other.....	206,606	17.97	256,526	19.92	228,378	18.07
Total.....	1,149,905	100	1,287,641	100	1,263,593	100

Exported to—	1912		1913		1914	
	Value.	Per cent of total value.	Value.	Per cent of total value.	Value.	Per cent of total value.
United Kingdom.....	\$357,461	25.72	\$673,995	27.15	\$632,558	34.52
Belgium.....	206,332	14.85	311,328	12.54	155,114	8.46
United States.....	274,746	19.77	435,456	17.54	277,775	15.16
Germany.....	38,442	2.77	123,945	4.99	65,456	3.57
French colonies.....	120,884	8.70	242,939	9.79	198,201	10.82
Argentina.....	83,171	5.99	191,234	7.71	141,363	7.71
All other.....	308,633	22.20	503,296	20.28	362,116	19.76
Total.....	1,389,669	100	2,482,193	100	1,832,583	100

GERMANY.

Development of the industry.—In the early days of the industry the brushes were coarse and not much skill was required in their manufacture. Home workers, whose products exceeded their domestic requirements, went over the country selling their wares. In the larger cities, however, brush makers maintained fixed places of business, but they were often compelled to visit adjacent markets to dispose of their product.

Brush making as a home industry developed in two centers. One at Schonheide and the other at Todtnau, in the Black Forest region of Baden. According to some authorities, this industry did not start until the beginning of the nineteenth century, but there is evidence from certain decrees that it was in existence as early as 1623.

Capitalism brought about many changes in the industry. The first large factory was erected in 1862 and others soon followed. The large manufacturers began to gain control over the home workers, who were virtually forced into selling their products to their large competitors.

From Todtnau the industry spread into numerous other places; in 1895 there were 440 establishments with 2,143 workers in the Grand Duchy of Baden. In 1907 the number of establishments had decreased to 276, but the number of workers had slightly increased. The decrease in the number of establishments was due to the absorption of the small independent producers by the large establishments. Home work was limited more and more to women and children.

Brushmaking was also carried on at an early date in the Hartz Mountains of Saxony. It was a home industry closely connected with peddling. It may be assumed that the industry was in existence as early as 1580, from which date brush makers were regular visitors to the Leipzig fairs. In 1854 there were a few establishments that employed outside help.

Concerning the later development of the industry in Germany, some information can be gained from the statistics of occupation and industry. The number of establishments increased from 6,098 in 1882 to 6,191 in 1885, and the number of employees from 15,378 to 22,970. The centralization of the industry is shown by a comparison of the number of establishments in 1895 with the number in 1882. Small factories decreased from 5,804 to 5,666, while medium size factories increased from 270 to 462 and large factories from 24 to 63. A similar comparison of the statistics for the years 1895 and 1907 shows an increase in the number of large factories and a decrease in the small factories. The following table shows the number of establishments and employees in the various political divisions of the German Empire for the year 1907.

Political division.	Number of establishments.	Listed as employees.	Number actually employed.	Political division.	Number of establishments.	Listed as employees.	Number actually employed.
Silesia.....	420	2,136	1,535	Rheinland.....	302	1,446	941
Northern Bavaria..	763	4,664	3,383	Saxony (Province).	231	949	626
Southern Bavaria..	520	1,671	987	All other.....	1,851	8,337	5,757
Saxony (Kingdom)	771	3,807	2,734				
Wurtemberg.....	421	1,642	992	Total.....	5,555	26,983	18,750
Baden.....	276	2,331	1,795				

A comparison of the number of employees, according to age and sex, for the years 1895 and 1907 is shown in the following table:

Year.	Employees.				Total.	Apprentices.
	Over 16 years of age.		Under 16 years of age.			
	Male.	Female.	Male.	Female.		
1895.....	8,916	3,443	1,202	616	14,177	1,227
1907.....	11,181	5,406	1,417	746	18,750	1,197

Use of machinery.—The census of 1907 gave, for the first time, data relating to the use of machines in the brush industry. Some of the machines in use at that time were boring, cutting, grinding, polishing, shaping, planing, stamping, mixing, combing, and washing machines. German manufacturers have also made use of the automatic boring and tuft setting machine. In fact, some advertise that the tufts are fastened with steel anchors, and others claim that they have successfully made toothbrushes with bone handles by machine.

An importer, formerly representing a German firm, gave the following description of labor conditions:

There is no child labor employed at all in our factory. We guarantee our goods to be union made goods, even the quill brushes. I think the proportion of woman labor employed is about 60 per cent. The women work in a separate part of the factory and do a different kind of work. The period of apprenticeship is moved up from year to year until they make the very finest artists' brushes. You see the brush industry is divided into a good many industries, a good many kinds of brushes. A factory may make paintbrushes, shaving brushes, and artists' brushes, and while they are all classified as brushes, each department of the factory is a separate department.

The socialist union over there controls the conditions of apprenticeship. The factory requires the learner to be of age so that he is able to work. The union will not allow men who are not of age to work in the factory. (From the statement of Mr. Walter Grumbacher, importer.)

Imports and exports.—No production figures are available for Germany, but an idea of the importance of the industry may be gained from the statistics of imports and exports. In these statistics, however, brooms, brushes, paintbrushes, and sieves are sometimes

included under one classification. In 1912 the imports of these commodities into Germany were valued at \$526,694 and the exports at \$2,757,706. For the year 1913 the imports were valued at \$486,234 and the exports at \$2,913,358.

It will be seen that Germany is an exporting country. Her goods before the war were shipped to all parts of the world. Great Britain was the principal customer, taking about 30 per cent of the German exports. Italy, Austria-Hungary, Russia, and Argentina also took considerable quantities. The United States takes about 7 per cent of Germany's total exports.

Since 1900 there has been a decrease in total exports, due partly to retaliatory measures of foreign countries against the customs policy of the German Government and partly to Japanese competition.

Germany's imports of brushes and brooms come principally from the Netherlands, Austria-Hungary, and France. Small quantities of fine hairbrushes have been imported from the United States.

The following tables show Germany's imports and exports of brooms and brushes, by principal countries, for the years 1909 to 1913, inclusive.

Imports into Germany, 1909-1913.

Commodities and countries from which imported.	1909	1910	1911	1912	1913
Brushes combined with bone and horn:					
France.....	\$153,510	\$180,166	\$211,344	\$192,066	\$165,172
All other.....	17,374	24,276	30,464	31,178	38,794
Total.....	170,884	204,442	241,808	223,244	203,966
Paint brushes combined with other materials:					
France.....	22,134	19,754	24,038	23,800	5,474
All other.....	5,474	3,094	3,570	14,280	25,466
Total.....	27,608	22,848	27,608	38,080	30,940
Brooms, brushes, and paint brushes, coarse, of vegetable material; mops:					
Belgium.....	22,610	23,562	19,278	23,086	22,848
Italy.....	47,600	46,886	53,550	43,316	30,940
Austria-Hungary.....	29,274	12,138	22,134	32,130	26,418
All other.....	19,516	17,136	15,946	15,232	14,280
Total.....	119,000	99,722	110,908	113,764	94,486
Brooms, brushes, and paint brushes of bristles or substitutes therefor (of animal origin); undyed feather dusters:					
Finland.....	8,568	14,042	12,852	19,278	17,850
All other.....	23,562	27,846	24,990	24,990	32,844
Total.....	32,130	41,888	37,842	44,268	50,694
Hairbrushes:					
France.....	12,852	14,280	15,708	9,044	7,378
United States.....	50,218	10,472	47,600	81,634	78,778
All other.....	22,610	64,022	30,464	16,660	19,992
Total.....	85,680	88,774	93,772	107,338	106,148

Exports from Germany, 1909-1913.

Commodities and countries to which exported.	1909	1910	1911	1912	1913
Brooms, brushes, and sieves, not specified:					
Italy.....	\$4,522	\$33,796	\$24,514	\$13,566	\$4,046
Switzerland.....	4,522	20,706	24,038	24,990	4,760
All other.....	18,802	16,660	31,654	30,702	16,660
Total.....	27,846	71,162	80,206	69,258	25,466
Brushes combined with bone and horn:					
Austria-Hungary.....	8,568	11,900	13,090	24,276	29,274
All other.....	39,746	39,032	69,734	104,482	111,860
Total.....	48,314	50,932	82,824	128,758	141,134
Paint brushes of all kinds:					
United Kingdom.....	353,192	369,852	362,474	375,802	430,066
Italy.....	66,640	104,720	149,702	105,672	108,052
Austria-Hungary.....	83,538	101,388	137,326	125,426	122,808
Argentina.....	83,776	105,196	111,384	105,434	77,588
United States.....	71,162	90,678	71,162	86,394	83,300
British India.....	23,086	23,324	37,128	34,272	33,796
All other.....	464,338	563,822	646,408	683,774	713,286
Total.....	1,145,732	1,358,980	1,515,584	1,516,774	1,568,896
Brooms, brushes, and paint brushes, coarse, of bristles, or of substitutes therefor (of animal origin); undyed feather dusters:					
United Kingdom.....	126,140	124,236	125,426	100,198	104,006
Netherlands.....	17,136	22,086	16,898	22,372	19,516
Denmark.....	12,614	20,468	16,660	15,470	14,042
All other.....	110,670	106,672	132,328	127,568	137,326
Total.....	266,560	273,462	291,312	265,608	274,890
Hairbrushes:					
United Kingdom.....	290,836	406,266	325,584	297,976	336,770
Netherlands.....	29,274	40,698	40,222	39,032	47,124
Argentina.....	82,110	26,180	32,844	17,612	18,326
United States.....	99,008	129,234	142,086	101,626	84,490
Austria-Hungary.....	.....	18,802	31,416	50,218	59,976
All other.....	245,616	254,184	272,986	270,844	356,286
Total.....	746,844	875,364	845,138	777,308	902,972

ENGLAND.

Centers of the industry.—London is the chief center of the brush industry. According to the returns made in the First Census of Production, 1907, there were 44 factories and 55 workshops engaged in the manufacture of brushes in London. Birmingham is also an important center, but the manufacture of brushes is mainly carried on by small firms which, as a rule, buy the bristles, vegetable fibers, and wooden handles or backs ready for use.

Materials.—England, like most of the other brush producing countries, imports many of her raw materials. Bristles, in normal times, were imported from European countries, China, and India. The fact that London is an important bristle market gives the British brush manufacturers an advantage. Bone, used in making toothbrush handles, is imported from Australia, South America and North America. Fibers are imported from various tropical countries, and wood for brush backs from Scandinavia and from tropical countries. Although England imports many of the raw materials

used in brush making, she is not entirely dependent upon foreign countries, as many of the materials can be obtained from her colonies. The strength of British merchants in China assures England of her share of the trade in Chinese bristles.

Methods of manufacture.—Brush making is largely handwork and to a considerable extent is a home industry. Some firms specialize in one branch of the industry; others make all classes except artists' brushes—a branch of the industry carried on by only a few small firms in London. Machinery is being increasingly used, although in Birmingham labor saving machinery has not replaced handwork even in those shops where it has been installed. That the British brush manufacturers intend to make greater use of machinery is apparent from a report of the convention of the British Brush Manufacturers' Association, recently held in Birmingham.¹ One of the topics discussed at the convention, in connection with reconstruction after the war, was the unemployment resulting from the introduction of new machinery. An interesting feature of the convention was the exhibition of the latest types of filling and boring machines. An operator on one of the filling machines was able to insert 130 knots per minute, and although it was not expected that such a rate of speed could be maintained, it was claimed for the machine that its output would equal that of 10 ordinary drawing hands.

Household brushes and brooms.—In making household brooms and brushes, such as hair, clothes, scrubbing, and the smaller brushes for domestic use, two methods are employed. The one is known as the drawn method and the other as pan work. The operations of the drawn method are bristle dressing, boring, drawing, and finishing. Bristle dressing consists of mixing and sorting the bristles. It is skilled handwork, and is usually done by men. Boring, or the drilling of holes in the brush block is usually done by men except when special machinery is used, in which case women are employed to tend the machines. Drawing consists of inserting and fastening the tufts in the holes by means of wire. This is a hand process and is done chiefly by women. Finishing consists of fastening the backs to the brush with glue or with pins and screws, shaping and finishing the woodwork. Machines, operated by men, are used for this process. By the pan work method, one end of the tuft is dipped into hot pitch and then inserted in a hole of the brush block. The better grades of hairbrushes, however, are made by the trepanning method.

Ivory and bone brushes.—Tooth, nail, hair, and shaving brushes are the principal brushes included under this heading. With the exception of shaving brushes, these are made largely by the hand-drawn, trepanned method. The shaping of the brush handle is

¹ Brooms, Brushes, and Handles, May, 1918.

done by men with the aid of machinery. Shaving brushes are cement set and are often made throughout by women and girls. More women are employed in this branch of the industry than in the household branch. The pyroxylin plastics are being increasingly used in making handles for toothbrushes.

Paint brushes.—Painters' and artists' brushes are made by hand, one worker making the brush throughout. The sorting and mixing of bristles form a distinct trade, the bristles coming to the brush maker ready for use.

Employees, wages, and hours of labor.—Both men and women are employed but in varying proportions in the different branches of the industry. In the First Census of Production, 1907, the average number of wage earners employed in brush factories was 9,860 and the average number of out-workers 1,602. Of the total number of out-workers only 59 were males, whereas about 50 per cent of the workers in factories were males.

Wages are paid on the piece-work basis. Girls entering the trade usually do not receive any pay for the first month. The next two months they receive two-thirds of what they can earn at piece work. The women under whose direction the girls work receive the other third. After the end of the third month the girls are paid all they earn. Boys entering the trade receive from \$1.22 to \$1.46 per week and from one-half to two-thirds of a journeyman's wage through the various stages of their apprenticeship. The rate of pay for pan work, which includes boring, setting, and trimming, averages 2 cents for 18 knots, and for the fancy or more difficult work, 2 cents for 14 to 16 knots. The rate of pay for drawn work varies according to the type of work; men receive 2 cents for 36 to 60 knots, and women 8 to 16 cents for 1,000 knots. In union shops the men engaged in boring stocks for drawn work receive from 8 to 20 cents per 1,000 holes. Data in regard to the foregoing rates and to the following statement of earnings are for the prewar period. In a good shop the average earnings are as follows:

Occupation:	Earnings per week.
Pan hands, men.....	\$6. 57 to \$9. 25
Pan hands, women.....	2. 43 to 3. 04
Paint brush, men.....	8. 52 to 10. 95
Borers, men.....	7. 30 to 9. 73
Borers, women.....	2. 30 to 2. 92
Drawers, women.....	2. 43 to 3. 04
Fancy drawers, women.....	3. 04 to 3. 65
Bristle mixers, men.....	8. 52 to 9. 73
Sandpaperers, boys.....	4. 14 to 4. 87
Handle cutters, men.....	8. 52 to 9. 73
Handle fashioners, men.....	5. 60 to 7. 30

The number of working hours per week ranges from 48 to 53. In some branches of the trade the daily hours are from 8 a. m. to 7 p. m., and 1 p. m. on Saturday with periods of rest for breakfast, luncheon, and tea. The trade-unions, of which there are several societies, are strong and the entrance into the trades is governed by their regulations.¹

Value of brushes produced.—The First Census of Production, 1907, furnishes the only available data of production for Great Britain. The quantity produced is not shown, as under the limitations imposed by the census act it was not possible to require manufacturers to state the quantity of their output in detail. A number of firms, whose production covered about one-third of the value of the total output, however, reported the number of brushes they made, and the value per dozen computed on their returns is as follows: Household and trade brooms and brushes \$1.28; painters', decorators', and whitewashers' brushes, \$4; fancy and toilet brushes not of bone, \$3.60; bone brushes, \$0.97; and machinery brushes, \$5.56. In the following table the value of the output is given for the various branches of the trade.

Value of production of brushes in Great Britain, 1907.

[Figures from Census of Production, Great Britain, 1907.]¹

	England, Wales, and Ireland.	Scotland.	United Kingdom.
Household and trade brooms and brushes.....	\$4,574,510.00	\$316,322.50	\$4,890,832.50
Painters', decorators', and whitewashers' brushes.....	1,635,144.00	145,995.00	1,781,139.00
Fancy and toilet brushes (not of bone).....	807,839.00	4,866.50	812,705.50
Bone brushes.....	457,451.00	.....	457,451.00
Machinery brushes.....	452,584.50	34,065.50	486,650.00
Brushes not separately distinguished.....	223,859.00	.....	223,859.00
Total brushes.....	8,151,387.50	2 501,249.50	8,652,637.00
Stock, handles, etc.....	92,463.50	.....	92,463.50
Other products.....	111,929.50	.....	111,929.50
Total value of goods made.....	8,355,780.50	501,249.50	8,857,030.00
Amount received for work for the trade.....	38,932.00	.....	38,932.00
Total value of goods made and work done.....	8,394,712.50	501,249.50	8,895,962.00
Cost of materials used.....	4,443,114.50	272,524.00	4,715,638.50
Net output.....	3,951,598.00	228,725.50	4,180,323.50

¹ Pounds converted to United States equivalent at \$4.8665 per £.

² Does not include brushes to the value of \$121,552.50 returned on schedules for other trades and \$24,332.50 made in philanthropic institutions.

Imports and exports.—England imports brushes in greater quantity and value than she exports. Since 1911 the quantity imported has varied between 1,541,892 dozens in 1914 and 2,348,322 dozens in 1916, and the value between \$1,727,135 in 1914 and \$2,219,810 in 1913. Before the war England depended chiefly on Germany, Belgium, and France for her imports. From 1911 to 1914, inclusive,

¹ General Brush Trade. Report on Birmingham Trades. Board of Trade, London, 1913.

imports from Germany were between 32 and 36 per cent of the total value of all brushes imported, those from Belgium between 25 and 28 per cent, and those from France between 16 and 23 per cent. Since 1914 the imports from these countries have declined, England receiving only 0.07 per cent from Germany, 14.2 per cent from France, and none from Belgium.

England, shut off from her imports of brushes from Germany and Belgium, turned to Japan and the United States. The imports from Japan, although gradually increasing from year to year, amounted to only 5.7 per cent of the total value imported in 1913. The big increase began in 1914 when they were 12.5 per cent of the total value imported. The percentage was 45.3 in 1915 and 52 in 1916. The imports from Japan amounted to 289,259 dozens valued at \$126,460 in 1913, and in 1916 to 1,591,561 dozens valued at \$1,094,344, an increase in value of over 760 per cent. The imports from the United States up to 1914 were not in excess of 3 per cent of the total value imported but since then have increased rapidly. In 1914 imports from the United States amounted to 4.3 per cent of the total value of all brushes imported, in 1915 to 18.5 per cent, and in 1916 to 22.9 per cent. England imported from the United States 26,693 dozens valued at \$56,349 in 1913, and 352,772 dozens valued at \$481,127 in 1916—an increase in value of over 750 per cent. England also imported brushes from Austria-Hungary, Italy and the Netherlands.

The exports of brushes from England before the war averaged \$1,150,000. They fell to \$1,052,312 in 1914 and to \$910,824 in 1915, but rose to \$1,149,944 in 1916. Notwithstanding the war, England has held her export trade, which, however, has been principally with her colonies. Exclusive of reexports of brushes of foreign and colonial origin, the British possessions have taken from two-thirds to three-fourths of the total value of exports. The United States is the principal foreign country to which England exports brushes. The percentage for the United States of the total exports has varied since 1911 from 8.4 to 12.2. In 1916 the percentage was 8.8. Argentina has taken from 2 to 4.3 per cent, Brazil from 1 to 2.2 per cent, and Germany, before the war, from 2.6 to 3.3 per cent of the total value of the exports. The export trade with other countries is not important. Reexports of brushes of foreign and colonial origin have varied since 1911 from \$68,652 to \$129,254, of which the British colonies took, before the war, more than four-fifths, and, since the war, about two-thirds.

The following table shows the value of brooms and brushes imported into the United Kingdom, by countries of origin, and exported from, by countries of destination, 1911 to 1916, inclusive.

General imports of brooms and brushes into the United Kingdom, 1911-1916.

Imported from—	1911	1912	1913	1914	1915	1916
Germany.....	\$722,695	\$699,005	\$790,057	\$553,934	.....	\$1,363
Netherlands.....	34,260	35,282	29,588	32,163	\$119,025	83,558
Belgium.....	577,668	541,184	611,875	471,802	116	.....
France.....	428,359	471,058	423,167	277,265	299,616	298,662
Italy.....	55,283	50,505	63,829	47,706	155,665	86,560
Austria-Hungary.....	117,828	94,653	56,948	18,901	3,918	.....
Japan.....	83,748	87,533	126,460	216,554	832,128	1,094,344
United States.....	45,550	46,981	56,349	74,681	340,484	481,127
Other countries.....	45,896	37,715	44,616	27,365	62,077	48,470
Total from foreign countries.....	2,111,287	2,063,916	2,202,889	1,720,371	1,813,029	2,094,084
British possessions.....	12,750	6,940	16,921	6,764	24,454	8,453
Grand total.....	2,124,037	2,070,856	2,219,810	1,727,135	1,837,483	2,102,537

Domestic exports of brooms and brushes from the United Kingdom, 1911-1916.

Exported to—	1911	1912	1913	1914	1915	1916
Germany.....	\$33,336	\$39,531	\$30,021	\$17,349	.....	.....
France.....	8,740	9,543	11,310	6,730	\$36,143	\$43,774
United States.....	138,525	136,476	96,468	112,294	96,420	101,272
Chile.....	10,638	14,551	16,103	8,025	4,711	13,178
Brazil.....	23,958	22,615	25,573	10,813	16,775	22,040
Argentine Republic.....	38,528	40,947	34,202	44,825	17,758	29,360
Other countries.....	90,658	97,057	93,827	74,468	59,469	92,936
Total to foreign countries.....	344,383	360,720	307,504	274,504	231,276	302,560
British possessions.....	788,582	808,184	847,374	777,808	679,548	847,384
Grand total.....	1,132,965	1,168,904	1,154,878	1,052,312	910,824	1,149,944

Foreign and colonial exports of brooms and brushes from the United Kingdom, 1911-1916.

Exported to—	1911	1912	1913	1914	1915	1916
Foreign countries.....	\$18,785	\$15,164	\$21,082	\$20,050	\$25,598	\$30,542
British possessions.....	110,469	103,408	86,745	70,491	43,054	63,917
Total.....	129,254	118,572	107,827	90,541	68,652	94,459

AUSTRIA-HUNGARY.

Very little descriptive material is available in regard to the brush industry in Austria-Hungary. As in other brush-producing countries of Europe, much of the work is done by hand not only in homes but in the factories as well. Austria makes use of machinery, however, in the production of toilet brushes. The automatic tooth brush boring and filling machine was invented in Austria. The patent rights were purchased by an American concern, which has since developed and improved the original type. Austria uses pyroxylin plastics as well as bone in the manufacture of tooth brushes; the former material is better adapted to the use of automatic machinery than the latter.

The following is quoted from a report on the brush industry in Austria by Consul General Charles Denby, Vienna.¹

¹ Daily Consular and Trade Reports, May 22, 1911.

Brush making in Austria is an industry extensively followed by the blind, it being estimated that 50 per cent of the workers in this trade are sightless. The blind employees usually work with a seeing master, and it is difficult for a blind workman to obtain a master's license. The blind employees work alone, and home work is largely practiced.

The brush makers' union prescribed nine hours of work per day, but these hours are subject to increase or decrease by agreement. Hours of labor are disregarded by blind workers and do not apply to home work. Women, both blind and seeing, are employed in brush making, men doing the cutting and heavy work, women the threading of the hair and the light work. In cities children under 14 years of age are not permitted to work. In the country districts children of all ages are employed, particularly in home work. The daily wages of a blind skilled worker are about 60 cents; of a seeing skilled worker about twice that.

Prison labor is said to be employed in making brushes, particularly in Hungary, but no exact information as to this feature can be secured, nor are prison-made goods sold as such in the market.

There are 20 brush-making establishments in Vienna, of which 15 are shops of considerable size, though there are no large factories. A trade book mentions 66 such shops outside of Vienna in Austria (not including Hungary). Only three or four of the total establishments are conducted as stock companies.

Imports into Austria-Hungary, 1909-1913.

Commodity and country from which imported.	1909	1910	1911	1912	1913
Coarse paint brushes:					
Germany.....	\$3,451	\$7,034	\$7,460	\$7,929	\$12,576
Total.....	3,451	7,034	7,460	7,929	12,576
Paint brushes with mountings of ordinary materials:					
Germany.....	3,410	6,650	6,778	7,929	8,640
All other.....	122	384	128	.....	1,851
Total.....	3,532	7,034	6,906	7,929	10,491
Paint brushes with mountings of fine materials:					
Germany.....	76,633	72,573	62,930	43,138	54,566
France.....	8,628	4,568	5,583	3,553	8,445
All other.....	1,522	1,014	12,180	6,598	8,445
Total.....	86,783	78,155	80,693	53,289	71,456
Paint brushes of prepared bristles, mounted or not in wood or iron, not polished or lacquered:					
Germany.....	117,220	85,565	76,125	73,385	52,678
All other.....	2,631	914	1,827	609	609
Total.....	119,851	86,479	77,952	73,994	53,287
Fine bristle or hair paint brushes, mounted in wood, and with round or flat metal holdfasts:					
Germany.....	45,310	53,592	66,746	66,746	82,986
All other.....	1,948	487	1,949	1,949	6,252
Total.....	47,258	54,079	68,695	68,695	89,238
Other common brushmakers' ware:					
Germany.....	18,835	20,789	21,883	23,994	23,837
Italy.....	234	703	782	703	547
United States.....	78	78	.....	625	625
All other.....	2,033	2,033	2,188	1,329	235
Total.....	21,180	23,603	24,853	26,651	25,244
Brushmakers' ware, not specially mentioned, with mountings of common materials:					
Germany.....	21,924	23,386	27,770	32,521	36,175
France.....	2,680	2,801	2,558	1,462	4,385
Great Britain.....	609	1,462	2,314	2,679	2,558
United States.....	1,218	1,096	1,340	731	974
All other.....	487	853	609	1,827	974
Total.....	26,918	29,598	34,591	39,220	45,066

Imports into Austria-Hungary, 1909-1913—Continued.

Commodity and country into which imported.	1909	1910	1911	1912	1913
Brushmakers' ware, not specially mentioned, with mountings of fine materials:					
Germany.....	\$33,617	\$39,171	\$37,709	\$49,402	\$56,125
France.....	57,587	57,879	60,510	72,496	59,633
Great Britain.....	2,046	3,216	4,385	3,508	4,677
United States.....	1,754	2,631	.....	292	1,754
All other.....	1,169	292	292	2,046	4,969
Total.....	96,173	103,189	102,896	127,744	127,158
Brushmakers' ware, not specially mentioned, with mountings of very fine materials:					
Germany.....	9,257	8,282	7,308	6,821	8,282
All other.....	974	.....	.....	.....	.....
Total.....	10,231	8,282	7,308	6,821	8,282

Exports from Austria-Hungary, 1909-1913.

Commodity and country to which exported.	1909	1910	1911	1912	1913
Coarse paint brushes:					
Germany.....	\$487	\$4,007	\$3,879	\$5,585	\$6,352
United States.....	244	.....	43	.....	.....
All other.....	1,137	4,135	3,496	2,131	1,577
Total.....	1,868	8,142	7,418	7,716	7,929
Paint brushes with mountings of ordinary materials:					
Germany.....	2,984	2,284	4,202	3,654	3,289
All other.....	7,844	8,404	8,770	5,481	6,029
Total.....	10,828	10,688	12,972	9,135	9,318
Paint brushes with mountings of fine materials:					
Germany.....	4,466	9,744	5,684	4,060	6,760
Russia in Europe.....	1,218	6,090	6,902	2,030	3,004
All other.....	3,248	5,278	4,060	2,436	3,756
Total.....	8,932	21,112	16,646	8,526	13,520
Other common brushmakers' ware:					
Germany.....	25,700	29,597	32,947	30,511	71,171
France.....	.....	.....	183	.....	3,901
Great Britain.....	974	58,526	214,185	229,654	226,110
Russia in Europe.....	1,157	1,157	2,132	2,314	7,801
Turkey in Europe.....	1,705	3,349	1,401	4,933	7,865
United States.....	.....	487	2,070	913	1,790
All other.....	5,420	7,308	14,616	26,918	12,469
Total.....	34,956	100,424	267,534	295,243	331,107
Other brushmakers' ware not specially mentioned with mountings of ordinary materials:					
Bulgaria.....	8,867	7,588	9,449	14,217	3,002
Germany.....	57,892	53,117	20,575	11,921	18,103
Greece.....	3,581	3,837	2,737	1,325	6,358
Italy.....	2,302	1,364	1,060	1,766	2,384
Russia in Europe.....	1,535	6,053	3,797	4,680	4,503
Turkey in Europe.....	28,562	32,484	33,026	37,971	30,642
Turkey in Asia.....	23,276	23,191	23,136	34,792	32,673
Egypt.....	13,556	5,627	8,742	14,394	6,093
All other.....	303,610	255,439	27,198	17,838	28,611
Total.....	443,181	388,700	129,720	138,904	132,369
Other brushmakers' ware, not specially mentioned with mountings of fine materials:					
Germany.....	548	1,462	914	914	2,923
Switzerland.....	731	914	365	548	2,010
All other.....	2,558	2,009	2,375	2,740	3,289
Total.....	3,837	4,385	3,654	4,202	8,222

JAPAN.

The brush industry in Japan has been in existence a little over a quarter of a century. An enterprising American, realizing the advantages that Japan offered in the way of abundant and cheap labor, began the manufacture of brushes in that country in 1891. Training the workers to become skilled artisans and finding a market for the product were the chief difficulties in establishing a trade. The goods produced in the early stages of the industry were cheap and inferior in quality and could not compete with the better grades of brushes made in the United States and Europe, where the industry has been established for many years. The Japanese therefore devoted their energies to improving their methods of manufacture and the quality of their brushes. They have met with such success that Japan is to-day (1918) one of the leading countries in the production of toilet brushes, the branch of the industry to which until recently she has confined her efforts. Since the outbreak of the war she has enlarged the scope of her brush manufacture and is now offering in the American market artists' brushes and some of the smaller paint and varnish brushes. The industry is carried on in all parts of Japan but centers in and around Osaka, where over 80 per cent of the brushes are produced.

Materials.—The raw materials used in brush making are nearly all imported. Bristles are obtained from China and Russia; bone from the United States, Australia, China, and South America; wood for hairbrushes is imported in the log, although some Japanese oak and maple are used; thread is from Scotland; chemicals used in bleaching, with the exception of sulphur, are from foreign sources, as are also materials for polishing and finishing and the paper and pasteboard used for boxes. Japan's advantages in regard to materials are her nearness to the Chinese bristle markets and her control of the supply of camphor, an essential ingredient of the pyroxylin plastics used for backs or handles.

Celluloid is an American product. It was discovered here; it has been made a commercial success here by American capital and American brains. Pyroxylin plastic material has been made in Germany, Austria, France, England, and Japan. Perhaps the most dangerous competition to the industry that exists is with Japan, largely because that country controls the world's camphor supply. There used to be three producing points for camphor, one Japan proper, one Formosa, and one China. Chinese camphor was always inferior and in recent years it has not been produced at all. (From the statement of Mr. D. G. Maynard, of the Celluloid Co.)

It is true that Japan produces most of the natural camphor, but Germany made celluloid, I think, from synthetic camphor and produced celluloid which was equal in quality and price to that produced anywhere in the world. (From the statement of Mr. W. B. Gibson, importer.)

Methods of manufacture.—The preparation of the bristles and the shaping, drilling, and polishing of handles and backs are done in the factory. Drawing, one of the principal operations in the manufacture of toilet brushes, is given out to be done in the country; especially is this true of the larger factories. In the manufacture of toilet brushes, the chief difference between the methods employed in Japan and in the United States is the manner in which the tufts of bristles are secured in the back or handle. In Japan the tufts are drawn into the block by hand, whereas in the United States they are generally inserted by automatic machinery and secured by means of staples or anchors.

The use of machinery has not proved profitable in Japan. The only factory now (spring of 1918) using machines is being reorganized. Generally speaking, all operations are performed in the factories. Approximately 90 per cent of the wage earners are employed in factories. Sanitary arrangements are crude, but the interiors are kept clean, especially in the drawing factories, which are generally in rural districts. (From the statement of Mr. P. B. T. Williams, of Williams Brush Co., importers.)

We have in the country what we call drawing factories. These small factories are established in the villages, in sections where it is possible to get drawing help; the help comes into the drawing factories and draws the bristles into the brushes in those plants. The rest of the work is done entirely in the main factory and the whole method is based on a cost system which is modern in every way.

The laws of Japan regarding the age of working people have changed considerably in the last six or seven years. I can not give the age limits under those laws, but can only say that they exist. At the same time laws have been passed compelling our factory to put in machinery for removing the dust from the bone-shaping departments, which is only one item showing that sanitary conditions must be maintained. The bristle imported in the finished article from all countries is thoroughly sterilized. The method is to wash it with soap and water and to put it in a sulphur bleach. In addition, in Japan, we wash it with a very strong solution of peroxide of hydrogen and it is impossible that there should be any disease attached to the bristle when it is finished. (From the statement of Mr. W. B. Gibson, importer.)

Employees, wages, and hours of labor.—There are only a few large brush factories in Japan. The average number of employees per factory or workshop was less than eight in 1915. The total number of employees for the same year was 4,239, more than two-fifths of whom were females. These figures include employees in factories or workshops but apparently not those engaged in home work. It is generally held, by those familiar with conditions in Japan, that Japanese workers are not so efficient as those in other countries. Consul George N. West, Kobe, states:

In a general way the output of labor, whether that of men, women, or children, is not equal to half that of skilled or unskilled labor in the United States.¹

Wages are low in Japan compared with those paid in other brush-producing countries. The following data quoted from the report of Consul West, are not representative of the scale of wages in the

¹ Daily Consular and Trade Reports, May 22, 1911.

brush industry at the present time (1918), but are used to show prewar rates.

Washing and dressing bristles requires little skill, and the average daily wage is 27½ to 37½ cents for males and 12½ to 17½ cents for females. Few children are employed; their wages run from 7½ to 11 cents a day.

In making hair, nail, and tooth brushes, wages for females run as high as 22½ cents per day, while skilled men earn from \$12.50 in the rough preparing to \$27.50 and \$30 per month where real skill is required. Skilled laborers, both men and women, working at piecework in the factories earn about one-fourth more than those on day wages, but they do not take the short rest allowed the others. The skilled labor is for the most part employed in the production of the more expensive classes of brushes and in the manufacture of samples and new work.

Wages in Japan are increasing, and although there are no official figures to show what this increase is in the brush industry, the general average, given in the following table of index number of wages,¹ indicates the trend.

Year.	Grand average.	Year.	Grand average.	Year.	Grand average.	Year.	Grand average.
1900.....	100.0	1906.....	118.4	1912.....	157.2	1914.....	160.1
1904.....	107.5	1907.....	134.1	1913.....	160.8	1915.....	158.6
1905.....	112.1	1908.....	143.0				

The working hours in the factories are from 7 a. m. to 6 p. m., with two periods of rest, one at noon and one in the afternoon. Although there are seven working days in a week, employees are required to put in only 26 days in a month. For the drawing that is given out to be done in the country, there are no regular working hours. Families, including small children, engaged on this kind of work, do it when not occupied with their small farms, chiefly on rainy days and at night.

In regard to government assistance in the brush industry, Mr. G. S. Gibson states that the Japanese Government does not subsidize brush manufacturers.

Imports and exports.—Statistics of imports of brushes are not shown in official publications. There is not much of a market for good brushes in Japan even for the domestic producers. Japanese hotel managers supply a cheap toothbrush, which is used but once and then thrown away. Toothbrushes with bamboo handles may be purchased for 2½ to 4 cents each. Round and flat paint brushes, however, are imported, as are various household brushes, which up to the present time (1918) have not been produced to any extent.

Practically all of the better grades of brushes made in Japan are exported. For the 10 years 1907 to 1916, the value of toothbrushes exported ranged from 24 to 29 cents per dozen; hairbrushes from \$1.42 to \$2.30 per dozen; nail brushes 34 to 58 cents per dozen; and

¹ Thirty-second Statistical Report of the Department of Agriculture and Commerce, Japan.

clothing brushes \$0.85 to \$1.60 per dozen. The various kinds of brushes exported show a general tendency to decline in value. The United States is Japan's best customer. In only two years since 1907 has the United States taken less than 50 per cent of the total value of brushes exported by Japan. The percentage fell to 33.18 in 1915 and to 40.48 in 1916. In these years Japan increased the percentage of exports to Great Britain and other countries, because of the activities of British agents in making purchases for their Government and because of the decrease in exports by the brush-producing countries of Europe. Complete statistics of Japanese exports for the year 1917 are not available. In this year the total value of all brushes exported to all countries amounted to \$3,025,134 divided as follows: Toothbrushes, 5,224,895 dozens valued at \$1,960,793; hairbrushes, 416,310 dozens valued at \$526,344; nail brushes, 370,772 dozens valued at \$138,658; clothing brushes, 176,699 dozens valued at \$160,408; all other brushes valued at \$238,931. Compared with the exports of the previous year, there were large increases in the exports of tooth, clothing, and all other brushes, and decreases in the exports of hair and nail brushes. The following tables give statistics of production for the years 1906 to 1916, inclusive, and of exports for the years 1907 to 1916, inclusive.

Quantity and value of brushes produced in Japan, 1906-1916.¹

Year.	Number of factories or workshops.	Employees.			Total brushes.	
		Total.	Male.	Female.	Quantity (dozens).	Value.
1906.....	213	3,118	1,470	1,648	4,450,448	\$1,129,805
1907.....	259	3,230	1,567	1,663	4,132,210	1,365,793
1908.....	277	3,091	1,584	1,507	5,514,195	1,757,175
1909.....	301	3,197	1,803	1,394	5,280,369	1,427,513
1910.....	288	3,258	1,905	1,353	5,037,087	1,472,410
1911.....	402	3,277	1,790	1,487	5,885,174	1,309,626
1912.....	387	2,976	1,605	1,371	4,290,754	1,173,826
1913.....	436	3,311	1,915	1,396	6,302,388	1,676,370
1914.....	468	3,683	2,003	1,680	5,280,911	1,600,358
1915.....	552	4,239	2,356	1,883	4,809,169	1,686,977
1916.....	667	5,485	2,947	2,538	6,213,158	2,145,820

Year.	Tooth brushes.		Hair brushes.	
	Quantity (dozens).	Value.	Quantity (dozens).	Value.
1906.....	4,228,932	\$624,109	105,267	\$87,952
1907.....	3,938,661	777,226	79,798	97,134
1908.....	5,331,234	1,140,526	111,049	187,548
1909.....	4,923,234	703,992	251,562	297,846
1910.....	4,678,269	712,603	231,711	296,833
1911.....	5,518,035	748,848	116,336	204,886
1912.....	3,845,749	649,483	120,952	212,000
1913.....	5,652,238	1,036,600	201,913	242,072
1914.....	4,551,875	973,824	209,777	250,496
1915.....	3,757,794	827,756	329,298	436,725
1916.....	4,782,581	1,032,497	199,994	350,277

¹ Thirty-second Statistical Report of the Department of Agriculture and Commerce, Japan. (Yen converted to United States money at \$0.498 per yen.)

Quantity and value of brushes produced in Japan, 1906-1916—Continued.

Year.	Paste brushes. ¹		Other brushes.	
	Quantity (dozens).	Value.	Quantity (dozens).	Value.
1906.....			116,249	\$417,744
1907.....			113,751	491,433
1908.....			71,912	429,101
1909.....			105,573	425,675
1910.....			127,107	462,974
1911.....			250,803	355,892
1912.....			324,053	312,343
1913.....			448,237	397,698
1914.....			519,259	376,038
1915.....	134,356	\$51,654	587,721	370,842
1916.....	153,272	46,385	1,077,311	716,661

¹ Not separately stated prior to 1915.Ten years' record of Japanese brush exports, 1907-1916.¹

Year.	Total brush exports to—			Toothbrush exports to—					
	All countries.	United States.		All countries.		United States.			
	Value.	Value.	Percent of total value to all countries.	Quantity (dozens).	Value.	Quantity (dozens).	Value.	Percent of total quantity to all countries.	Percent of total value to all countries.
1907.....	\$606,132	\$405,400	66.88	1,298,800	\$361,952	817,111	\$243,807	62.94	67.35
1908.....	560,498	403,370	71.96	1,238,158	347,386	857,274	252,121	69.23	72.57
1909.....	599,924	413,924	68.99	1,275,750	362,526	816,231	252,027	63.98	69.51
1910.....	862,699	631,718	73.22	1,879,108	542,817	1,297,484	395,129	69.04	72.79
1911.....	1,002,206	636,629	63.52	1,756,744	456,637	987,843	272,350	56.23	59.64
1912.....	936,759	510,916	54.54	1,886,518	467,536	902,625	246,659	47.84	52.76
1913.....	1,137,497	622,512	54.71	1,611,527	407,326	647,235	190,713	40.16	46.82
1914.....	1,342,258	744,291	55.45	1,895,042	530,672	844,207	274,831	44.55	51.78
1915.....	1,928,268	639,990	33.18	3,165,938	765,035	984,667	228,831	31.10	29.91
1916.....	2,640,249	1,068,928	40.48	3,602,017	1,011,521	1,421,863	444,736	39.47	43.97

Hairbrush exports to—

Year.	All countries.		United States.			
	Quantity (dozens).	Value.	Quantity (dozens).	Value.	Per cent of total quantity to all countries.	Per cent of total value to all countries.
	1907.....	49,591	\$114,006	34,294	\$87,172	69.15	76.46
1908.....	54,019	105,620	43,244	87,501	80.05	82.84
1909.....	56,151	108,189	41,179	82,465	73.33	76.22
1910.....	90,120	155,516	71,205	125,047	79.01	80.41
1911.....	125,043	223,533	81,116	153,263	64.87	68.56
1912.....	166,014	285,244	89,983	168,754	54.20	59.16
1913.....	272,894	463,282	165,476	292,007	60.63	63.03
1914.....	286,585	456,484	176,504	266,909	61.58	58.47
1915.....	416,624	759,202	140,217	251,701	33.65	33.15
1916.....	769,358	1,092,085	261,063	451,344	33.93	41.33

¹ Annual return of the foreign trade of the Empire of Japan. Yen converted into United States money, at \$0.498 per yen.

Ten years' record of Japanese brush exports, 1907-1916—Continued.

Year.	Nailbrush exports to—					
	All countries.		United States.			
	Quantity (dozens).	Value.	Quantity (dozens).	Value.	Per cent of total quantity to all countries.	Per cent of total value to all countries.
1907.....	134,484	\$71,119	106,076	\$51,806	78.87	72.85
1908.....	107,575	57,705	82,302	41,164	76.50	71.33
1909.....	91,482	52,303	66,006	34,145	72.15	65.28
1910.....	156,392	73,084	118,063	48,857	75.49	66.85
1911.....	316,104	183,824	215,186	114,452	68.07	62.26
1912.....	251,327	91,085	160,246	58,517	63.75	64.24
1913.....	385,778	160,077	267,647	106,382	69.37	66.45
1914.....	458,617	204,715	302,578	137,091	65.97	66.97
1915.....	577,383	195,688	294,115	117,415	50.93	60.00
1916.....	429,415	213,642	229,298	134,628	53.39	63.01

Clothing brush exports to ¹—

Year.	All countries.		United States.			
	Quantity (dozens).	Value.	Quantity (dozens).	Value.	Per cent of total quantity to all countries.	Per cent of total value to all countries.
1912.....	50,319	\$59,053	12,805	\$29,982	25.44	50.77
1913.....	57,803	73,704	9,936	27,567	17.19	37.40
1914.....	60,001	96,004	13,344	39,592	22.23	41.23
1915.....	103,798	133,205	23,745	35,047	22.87	26.31
1916.....	163,378	139,198	29,966	31,839	18.34	22.87

¹ Included in "Other brush exports" prior to 1912.

Clothing brush exports to—

Year.	All countries.	United States.	
	Value.	Value.	Per cent of total value to all countries.
1907.....	\$59,055	\$22,615	38.29
1908.....	49,787	22,584	45.36
1909.....	76,906	45,287	58.88
1910.....	91,282	62,685	68.68
1911.....	133,212	96,564	69.86
1912.....	33,841	7,004	20.69
1913.....	33,108	5,843	17.65
1914.....	54,383	25,868	47.56
1915.....	75,138	6,996	9.31
1916.....	183,803	6,381	3.47

*Export of hairbrushes from Japan, 1907, 1910, 1913, and 1916.*¹

Exported to—	1907			1910		
	Quantity (dozens).	Value.	Per cent of total value.	Quantity (dozens).	Value.	Per cent of total value.
United States.....	34,294	\$87,172	76.46	71,205	\$125,047	80.41
Great Britain.....	874	1,987	1.75	964	2,990	1.92
British India.....	39	68	.05	1,077	1,267	.82
Canada.....	2,670	9,768	8.56	3,559	8,548	5.50
Australia.....	9,951	11,313	9.93	9,567	12,277	7.89
All other.....	1,763	3,698	3.25	3,748	5,387	3.46
Total.....	49,591	114,006	100.00	90,120	155,516	100.00

Exported to—	1913			1916		
	Quantity (dozens).	Value.	Per cent of total value.	Quantity (dozens).	Value.	Per cent of total value.
United States.....	165,476	\$292,007	63.03	261,063	\$451,344	41.33
Great Britain.....	23,283	44,389	9.58	276,757	379,770	34.77
British India.....	11,846	11,318	2.44	46,147	36,355	3.33
Canada.....	30,146	46,803	10.10	47,670	71,933	6.59
Australia.....	23,448	36,494	7.88	70,775	81,454	7.46
All other.....	18,695	32,271	6.97	66,946	71,229	6.52
Total.....	272,894	463,282	100.00	769,358	1,092,085	100.00

*Export of nailbrushes from Japan, 1907, 1910, 1913, and 1916.*¹

Exported to—	1907			1910		
	Quantity (dozens).	Value.	Per cent of total value.	Quantity (dozens).	Value.	Per cent of total value.
United States.....	106,076	\$51,806	72.85	118,063	\$48,857	66.85
Great Britain.....	12,650	10,310	14.50	13,715	9,815	13.42
Canada.....	12,186	5,961	8.38	19,191	11,100	15.19
Australia.....	2,228	1,652	2.32	2,802	1,901	2.60
Germany.....	406	734	1.03	1,841	993	1.36
All other.....	938	656	.92	780	418	.58
Total.....	134,484	71,119	100.00	156,392	73,084	100.00

Exported to—	1913			1916		
	Quantity (dozens).	Value.	Per cent of total value.	Quantity (dozens).	Value.	Per cent of total value.
United States.....	267,647	\$106,382	66.45	229,298	\$134,628	63.01
Great Britain.....	60,517	27,200	16.99	128,390	49,911	23.36
Canada.....	39,898	18,126	11.33	20,423	12,727	5.96
Australia.....	11,067	5,092	3.18	28,347	9,717	4.55
Germany.....	2,942	1,366	.86	.....	.....	.....
All other.....	3,707	1,911	1.19	22,957	6,659	3.12
Total.....	385,778	160,077	100.00	429,415	213,642	100.00

¹ Annual return of the foreign trade of the Empire of Japan. Yen converted to the United States money at \$0.498 per yen.

Export of clothes brushes from Japan, 1913 and 1916.¹

Exported to—	1913			1916		
	Dozen.	Value.	Per cent of total value.	Dozen.	Value.	Per cent of total value.
United States.....	9,936	\$27,567	37.40	29,966	\$31,839	22.87
China.....	6,331	3,449	4.68	4,047	2,904	2.09
British India.....	2,789	2,804	3.81	28,537	17,492	12.57
Dutch East Indies.....	3,750	1,368	1.85	6,447	3,779	2.71
Great Britain.....	12,768	10,328	14.02	47,008	44,728	32.13
Canada.....	1,518	6,628	8.99	2,485	2,745	1.97
Australia.....	9,942	14,245	19.32	20,018	16,487	11.85
All other.....	10,769	7,315	9.93	24,670	19,224	13.81
Total.....	57,803	73,704	100.00	163,178	139,198	100.00

Export of toothbrushes from Japan, 1907, 1910, 1913, and 1916.¹

Exported to—	1907			1910		
	Quantity (dozens).	Value.	Per cent of total value.	Quantity (dozens).	Value.	Per cent of total value.
United States.....	817,111	\$243,807	67.35	1,297,484	\$395,129	72.79
China.....	56,415	12,620	3.49	84,001	16,023	2.95
Great Britain.....	80,083	34,824	9.62	72,146	22,782	4.20
Canada.....	94,244	30,201	8.34	175,529	57,508	10.59
Germany.....	7,176	2,531	.70	37,918	11,376	2.10
Australia.....	29,779	10,301	2.85	45,803	13,008	2.40
British India.....	47,752	6,137	1.70	35,173	4,676	.86
Dutch East Indies.....	73,496	7,676	2.12	29,896	3,118	.57
All other.....	92,744	13,855	3.83	101,158	19,197	3.54
Total.....	1,298,800	361,952	100.00	1,879,108	542,817	100.00

Exported to—	1913			1916		
	Quantity (dozens).	Value.	Per cent of total value.	Quantity (dozens).	Value.	Per cent of total value.
United States.....	647,235	\$190,713	46.82	1,421,863	\$444,736	43.97
China.....	227,292	45,236	11.11	425,886	110,046	10.88
Great Britain.....	136,453	33,989	8.35	636,290	162,244	16.04
Canada.....	116,631	38,399	9.43	180,654	58,419	5.78
Germany.....	60,095	18,295	4.49	.....	.....	.....
Australia.....	65,758	17,817	4.37	199,671	65,572	6.48
British India.....	49,228	8,164	2.00	101,374	16,156	1.60
Dutch East Indies.....	88,951	7,096	1.74	120,433	14,888	1.47
All other.....	219,884	47,617	11.69	515,846	139,460	13.78
Total.....	1,611,527	407,326	100.00	3,602,017	1,011,521	100.00

¹ Annual return of the foreign trade of the Empire of Japan. Yen converted to United States money at \$0.498 per yen.

*Export of other brushes from Japan, 1907, 1910, 1913, and 1916.*¹

Exported to—	1907			1910		
	Dozen.	Value.	Per cent of total value.	Dozen.	Value.	Per cent of total value.
United States.....	(2)	\$22,615	38.29	(2)	\$62,685	68.68
China.....	(2)	5,046	8.54	(2)	2,435	2.67
British India.....	(2)	422	.72	(2)	1,789	1.96
Asiatic Russia.....	(2)	5,747	9.73	(2)	1,689	1.85
Great Britain.....	(2)	2,316	3.92	(2)	109	.12
Australia.....	(2)	13,143	22.26	(2)	9,931	10.88
All other.....	(2)	9,766	16.54	(2)	12,634	13.84
Total.....	(2)	59,055	100.00	(2)	91,272	100.00

Exported to—	1913			1916		
	Dozen.	Value.	Per cent of total value.	Dozen.	Value.	Per cent of total value.
United States.....	(2)	\$5,843	17.65	(2)	\$6,381	3.47
China.....	(2)	1,784	5.39	(2)	5,487	2.98
British India.....	(2)	840	2.54	(2)	30,756	16.73
Asiatic Russia.....	(2)	768	2.32	(2)	6,728	3.66
Great Britain.....	(2)	5,940	17.94	(2)	53,658	29.19
Australia.....	(2)	8,480	25.61	(2)	49,903	27.16
All other.....	(2)	9,453	28.55	(2)	30,890	16.81
Total.....	(2)	33,108	100.00	(2)	183,803	100.00

¹ Annual Return of the Foreign Trade of the Empire of Japan. Original figures given in yen converted to United States money at \$0.498 per yen; clothes brushes not separately shown in 1907 and 1910.

² Quantities not given.

GENERAL STATISTICS.

GENERAL STATISTICS.

*Domestic production of brushes for the years 1849, 1859, 1869, 1909, and 1914.*¹

(Abstract of the Census of Manufactures, 1914.)

	Number of establishments.	Wage earners (average number).	Primary horse-power.	Expressed in thousands.				
				Capital.	Wages.	Cost of materials.	Value of products. ²	Value added by manufacture.
UNITED STATES.								
1914.....	359	7,213	6,388	\$14,333	\$3,461	\$9,327	\$17,894	\$8,567
1909.....	384	6,954	4,967	11,092	3,041	7,187	14,694	7,507
1869.....	157	2,425	278	1,684	691	1,313	2,695	1,382
1859.....	121	2,378	.....	914	594	994	2,097	1,103
1849.....	146	2,405	.....	711	533	638	1,574	936
STATES, 1914.								
California.....	8	15	20	29	12	30	62	32
Colorado.....	3	7	9	9	5	5	18	13
Connecticut.....	11	130	153	147	61	154	299	145
Illinois.....	32	395	267	858	230	619	1,156	537
Maine.....	3	19	42	20	8	16	37	21
Maryland.....	9	559	813	1,548	297	1,051	1,862	811
Massachusetts.....	29	1,437	878	3,359	717	2,231	3,910	1,679
Michigan.....	10	157	51	325	73	165	348	183
Minnesota.....	5	53	29	124	33	173	244	71
Missouri.....	10	43	20	126	24	50	105	55
New Jersey.....	22	822	1,024	1,579	411	888	1,814	926
New York.....	107	1,568	1,248	3,050	772	1,840	3,835	1,995
Ohio.....	16	677	848	1,311	298	732	1,544	812
Pennsylvania.....	46	385	273	807	204	597	1,137	540
Rhode Island.....	10	86	34	69	38	66	138	72
Wisconsin.....	11	129	155	244	62	93	270	177
All other States.....	27	731	524	728	216	617	1,115	498

¹ The manufacture of brooms and that of brushes were shown as one industry at the censuses from 1879 to 1904, inclusive.

² In 1914, toilet brushes to the value of \$92,369, paint and varnish brushes to the value of \$309,169, and "all other" brushes to the value of \$685,399 were reported by establishments in other classifications.

*General imports of brushes into the United States, by countries, 1910-1917.*¹

Imported from—	1910	1911	1912	1913	1914	1915	1916	1917
France.....	\$677,091	\$801,847	\$749,189	\$753,029	\$682,003	\$312,891	\$265,386	\$259,142
Japan.....	510,552	736,781	602,923	604,490	665,952	757,421	843,020	1,800,300
Germany.....	281,471	416,900	448,550	423,189	514,240	308,167	46,330	1,305
England.....	239,267	256,667	211,998	263,812	267,734	221,891	112,401	121,351
Austria-Hungary.....	7,377	12,967	36,806	32,887	29,734	24,348	6,500	2,069
All other.....	16,442	15,904	17,683	11,896	21,190	19,471	19,173	25,809
Total.....	1,732,200	2,241,066	2,067,149	2,089,303	2,180,853	1,644,189	1,292,810	2,209,976

¹ Includes small amount of feather dusters and hair pencils.

Imports into the United States of brushes for consumption, 1894-1917.¹

(Under general tariff.)

Year.	Value.	Year.	Value.	Year.	Value.
1894.....	\$550,334.15	1902.....	\$1,151,266.37	1910.....	\$1,744,546.05
1895.....	658,083.20	1903.....	1,238,587.06	1911.....	2,150,335.09
1896.....	766,142.81	1904.....	1,369,757.31	1912.....	2,074,297.71
1897.....	784,891.05	1905.....	1,308,763.45	1913.....	2,074,134.86
1898.....	735,271.11	1906.....	1,380,183.92	1914.....	2,171,511.94
1899.....	891,161.35	1907.....	1,597,045.82	1915.....	1,670,821.00
1900.....	964,220.03	1908.....	1,653,347.68	1916.....	1,315,177.00
1901.....	1,134,395.54	1909.....	1,435,870.53	1917.....	2,195,659.00

¹ Includes small amounts of feather dusters and hair pencils.

Rates of duty and revenue derived from imports of brushes, 1910-1917.

Fiscal year.	Rates of duty.	Imports for consumption.	Duties collected.	Actual and computed ad valorem rate.
	<i>Per cent.</i>			<i>Per cent.</i>
1910.....	40	\$1,744,546.05	\$697,818.42	40
1911.....	40	2,150,335.09	860,134.03	40
1912.....	40	2,074,297.71	829,719.08	40
1913.....	40	2,074,134.86	829,653.94	40
1914.....	{ 40	¹ 563,158.95	¹ 225,263.58	40
	{ 35	² 1,608,352.99	² 562,923.55	35
1915.....	35	1,670,821.00	584,787.35	35
1916.....	35	1,315,177.00	460,311.95	35
1917.....	35	2,195,659.00	768,480.65	35

¹ Act of Aug. 5, 1909.² Act of Oct. 3, 1913.Domestic exports of brushes, from the United States, by countries, 1913-1917.¹

Exported to—	1913	1914	1915	1916	1917
Canada.....	\$237,359	\$191,647	\$128,851	\$143,421	\$247,997
Cuba.....	32,650	31,717	39,953	66,714	81,252
Australia.....	33,183	34,572	28,016	29,838	47,307
Mexico.....	25,066	17,640	9,618	13,695	56,849
England.....	23,607	27,213	301,865	621,104	70,038
Panama.....	13,954	14,309	12,076	25,190	36,947
Argentina.....	8,678	10,561	4,331	28,512	39,994
British India.....	5,349	6,718	4,440	6,430	16,933
Brazil.....	4,592	2,440	3,583	20,921	29,666
All others.....	101,854	113,092	72,183	176,437	236,647
Total.....	486,292	449,909	604,916	1,132,262	863,630

¹ Exports of brushes were not separately shown prior to 1913.

Imports, revenue, rates of duty, production, exports, and consumption of brushes for representative years of the tariff acts of 1894, 1897, 1909, and 1913.

	Act of Aug. 27, 1894.	Act of July 24, 1897.	Act of Aug. 5, 1909.	Act of Oct. 3, 1913.
	1896	1905	1912	1914
Imports:				
Value.....	\$766,142.81	\$1,308,763.45	\$2,074,297.71	¹ \$2,171,511.94
Duties.....	\$268,149.99	\$523,505.38	\$829,719.08	\$788,187.13
Rate (per cent).....	35	40	40	35
Production.....		² \$21,103,776.00	³ \$14,694,003.00	\$17,894,476.00
Domestic exports.....	² \$180,183.00	² \$327,083.00	² \$693,223.00	\$449,909.00
Consumption.....				\$19,616,078.94

¹ Includes \$563,158.95, July 1 to Oct. 3, 1913, at 40 per cent.² Includes brooms.³ Census of production, 1909.

Rates of duty and tariff classifications under tariff acts of 1883, 1890, 1894, 1897, 1909, and 1913.

Tariff act of—	Para-graph.	Classification or description.	Rates of duty ad valorem.
1883	.....	Brushes of all kinds	<i>Per cent.</i> 30
1890	427	Brushes and brooms of all kinds, including feather dusters and hair pencils in quills.....	40
1894	314	Hair pencils, brushes, and feather dusters.....	35
1897	410	Brushes, brooms, and feather dusters of all kinds and hair pencils in quills or otherwise.....	40
1909	423	do.....	40
1913	336	Brushes and feather dusters of all kinds and hair pencils in quills or otherwise.	35

TARIFF LEGISLATION AFFECTING BRUSHES.

REVIEW OF TARIFF LAWS.

BRISTLES.

With one exception, the duties on bristles, when enumerated in the tariff acts, have uniformly been specific. The minimum rate is 1 cent per pound; the maximum 15 cents per pound. In the act of 1846, which imposed ad valorem duties exclusively, the rate was 5 per cent. In 1857, in a general reduction made without specification of articles, this rate was reduced to 4 per cent ad valorem.

In the act of 1804 bristles of swine and in the act of 1841 bristles of all kinds were admitted to free entry. Since the act of 1890 a distinction has been made between bristles crude, or not sorted, bunched, or prepared, and those advanced in condition. The former have been exempt from duty and the latter dutiable at $7\frac{1}{2}$ cents per pound, except under the act of 1913, which reduced the rate to 7 cents per pound.

BRUSHES.

Duties upon brushes, on the other hand, have always been ad valorem. The rate has varied from $7\frac{1}{2}$ per cent in 1789 to 40 per cent in 1864, 1890, 1897, and 1909. Thirty per cent was imposed in the acts of 1816, 1842, 1846, 1861, and 1883, and 35 per cent in 1862, 1894, and 1913. In 1883 hair pencils, and since then hair pencils and feather dusters, have been classified with brushes at the same rate of duty.

The provision for bristles and brushes in the tariff act of October 3, 1913, are as follows:

BRUSHES.

Par. 336. * * * brushes and feather dusters of all kinds, and hair pencils in quills or otherwise, thirty-five per centum ad valorem.

BRISTLES.

Par. 337. Bristles, sorted, bunched, or prepared, seven cents per pound.

Par. 432. Bristles, crude, not sorted, bunched, or prepared. Free.

ABSTRACT OF TREASURY AND COURT DECISIONS RELATING TO BRUSHES.

BRISTLES AND OTHER MATERIALS FOR BRUSHES.

BRISTLES.

Under the system of partial revision from time to time in tariff legislation prior to 1883 *hog's bristles*, which were separately classified in the act of 1864, were held not included in the general clause in the act of 1872 for hair of animals.—*Von Stade v. Arthur*, 28 Fed. Cas., 1274.

But *hogs' or pigs' hair*, not commercially known as bristles, was held to be free of duty as animal hair under the act of 1890.—*In re Irsch*, G. A. 1448 (T. D. 12852).

Bristles sorted, bunched, or prepared in any manner were first separated from bristles not so advanced in the act of 1894. Under that act *bristles in bunches* were held dutiable as bristles bunched and not exempt from duty as crude. The provision was declared not limited to bristles prepared for brush makers' use.—*In re Lewisoohn*, G. A. 2993 (T. D. 15969).

Under subsequent litigation *bristles tied in bunches with their butt ends lying together* in preparation for brush makers' use were held to be bunched or prepared. The distinction was declared to be between absolute crudeness and advancement of one or more steps in preparation for the arts. Both sorting and bunching were adjudged unnecessary, subjection to either process being deemed sufficient.—*Pushee v. United States*, 158 Fed., 968 (T. D. 28782), affirming 155 Fed., 265, which affirmed G. A. 5483 (T. D. 24797).

But *uncleaned, unassorted bristles tied up in tufts or small bunches the "root" and "flag" ends mixed indiscriminately either way* were exempt from duty as crude.—*In re Woll*, G. A. 4297 (T. D. 20213).

The provision in the act of 1909 for bristles sorted, bunched, or prepared was construed not to include *pigs' bristles dyed and mounted on wire in the form of pompons or aigrettes* and used for millinery purposes, which were classified as artificial or ornamental feathers by similitude.—*In re Stewart Hess Co.*, Abstract 32296 (T. D. 33409); followed in Abstract 35453 (T. D. 34416).

In recent cases, the corresponding provision in the act of 1913 was held to require such sorting, or bunching, or preparation as tends in some way toward preparing the bristles and to exclude mere bunch-

ing irrespective of length of bristles or size of bunches.—In re Cedar, Abstract 37886; followed in Abstracts 37999 and 38366.

An importation classified by the collector as waste under this act was held to be exempt from duty as bristles, crude, not sorted or prepared.—In re Perry; Abstract 38178.

OTHER MATERIALS.

Of other materials for brushes, *bass, not manufactured or advanced in any manner except by cutting into lengths and putting into bunches for convenience of shipment*, was held exempt from duty under the provision in the act of 1883 for dried fiber and stems in a crude state not advanced in value or condition by a process of manufacture.—Appeal of P. Woll & Sons, T. D. 6593.

A mixture of hogs' hair and bristles in equal parts, the hair not curled, was held dutiable as bristles under the act of 1883 and not free under the provision for hair of hogs curled for beds or mattresses and not fit for bristles.—Appeal of P. Woll & Sons, T. D. 8667.

But *a mixture of bristles with goat hair in the proportion of 80 to 20 per cent* was held dutiable under the act of 1897 as bristles, directly or by similitude.—In re Cone, Abstract 17686 (T. D. 28626).

Feather bristles, so-called, manufactured from quills, were held dutiable under the same act as unenumerated articles and not directly or by similitude as bristles. In re Wilkens, G. A. 5861 (T. D. 25821).

Merchandise invoiced as "*dachshaar imitation*" and classified as an unenumerated article was held dutiable by similitude as bristles sorted, etc. In re Knauth, Abstract 21282 (T. D. 29790).

Cocoa fiber dressed, cut into uniform lengths, and bunched ready for use in the manufacture of brushes was held dutiable under the act of 1909 as unenumerated articles partly manufactured and not exempt from duty as crude cocoa fiber.—United States v. Flatt, 5 Ct. Cust. Appls., 210 (T. D. 34379), reversing Abstract 33808 (T. D. 33789), which followed Abstract 30026 (T. D. 32858), holding bass fiber cut into lengths exempt from duty as crude.

BRUSHES.

Powder puffs have several times been the subject of decisions. Under the Revised Statutes of 1874, they were held dutiable as brushes.—Appeals of McKesson & Robbins et al., T. D. 3028 and 3114; also under the act of 1890—in re Shoemaker et al., G. A. 1731 (T. D. 13351) and G. A. 2034 (T. D. 13881). But in a court case under the act of 1897 they were held not to be brushes in the tariff sense because while like brushes in use they do not resemble them in construction or material and hence are dutiable as manufactures of wool.—United States v. Borgfeldt, 153 Fed. 480 (T. D. 28142); followed in G. A. 6611 (T. D. 28222).

Miniature brushes imported with fans, furs, jewelry, or combs, known in commerce collectively as dolls' wardrobes, were held dutiable as toys under the act of 1864.—T. D. 569.

But *diminutive paintbrushes or hair pencils in quills, flimsily constructed and designed for the amusement of children* were held dutiable under the act of 1890 as "brushes" or as "hair pencils in quills" as more specific than "toys."—In re Rogge, G. A. 1053 (T. D. 12239).

Doll hairbrushes 4 inches long and not unfit for practical use have also been held dutiable as brushes rather than as toys. In re Davis, G. A. 3777 (T. D. 17843). This decision was under the act of 1894.

Miniature feather dusters, not adapted to use by children any more than by grown persons on gala occasions, held, in default of proof of commercial designation as toys, to come within the provision for "feather dusters of all kinds."—United States v. Scheuer, 4 Ct. Cust. Appls. 37 (T. D. 33224), reversing Abstract 29881 (T. D. 32842).

OTHER DECISIONS UPON BRUSHES.

REVISED STATUTES.

Scratch brushes of brass were held dutiable under the provision for brushes of all kinds in the Revised Statutes and not as manufactures of brass.—Appeal of Kearney & Swartchild, T. D. 5519.

ACT OF 1883.

Brushes in sets with hand mirrors were held dutiable as brushes where the values are separately stated; otherwise by component material of chief value.—Appeal of Vergho, Ruhling & Co., T. D. 6174.

But *toothbrush sets, consisting of brush and stand*, were held dutiable as an entirety and not separately as brushes and articles manufactured in part of iron, respectively.—Appeal of Schlessinger & Mayer (T. D. 8779).

Feather dustbrushes were held dutiable as brushes and not as feathers manufactured.—Appeal of John Schillito Co., T. D. 7015.

Hair pencils with wooden or iron handles used by surgeons as swabs and known commercially as throat brushes were held dutiable as brushes.—Appeal of Lehn & Fink, T. D. 8696.

Sink brushes were held dutiable as brushes and not as brooms.—Appeals of various persons, T. D. 8999.

ACT OF 1890.

Flesh brushes or flesh gloves of horsehair and linen, or of horsehair and wool, horsehair chief value, held dutiable as brushes and not as manufactures of animal hair. A handle was declared not essential to a brush. In re Schieffelin, G. A. 1313 (T. D. 12664).

The rule governing the *marking of hair brushes* to indicate the country of origin is whether they are usually or ordinarily marked as

a class and not whether particular shipments are marked.—Dept. order, T. D. 13042.

Quills filled with tooth powder and invoiced as toothbrushes were held dutiable as toilet preparations and not as brushes.—In re Kwong Lung Yuen, G. A. 1628 (T. D. 13207).

Penwipers made of circular pieces of woolen cloth and flannel stitched together in the center and surmounted with grouped figures of pigs and cats, the figures composed of leather and cotton velvet, respectively, were held not to be brushes, and *dampeners having a wedge-shaped piece of india rubber about 2 inches long, in place of hair or bristles, and the width of the brush, fastened in the stocks thereof, used in wetting the leaves of copying books and known as copying book brushes,* were held to be brushes.—In re Lippincott Co., G. A. 1946 (T. D. 13752).

Crumb trays and brushes invoiced as entreties were held separately dutiable at 40 per cent upon the value of the brushes and 35 per cent upon the value of the trays.—In re Solomon, G. A. 2477 (T. D. 14755).

Steel brush ink erasers were held dutiable as erasers and not as brushes nor as manufactures of metal.—In re Faber, G. A. 2728 (T. D. 15235).

ACT OF 1894.

Haidebrooms, consisting of bunches of stiff fiber cut into uniform lengths and bound tightly with thin wooden strips, except at the lower end, were held dutiable as brooms and not as brushes.—In re Thurnauer, G. A. 2987 (T. D. 15963).

Flute swabs or brushes, used for cleaning flutes, were held dutiable as brushes and not as part of musical instruments.—In re Foote, G. A. 3133 (T. D. 16304). (See clarinet cleaners under act of 1909, *infra*.)

An implement for sweeping, consisting of a wooden block 15 inches long by 3 inches wide, bound around the edges with flannel or felt, pierced on one side for a handle and having on the other side woolen strips, held to be a brush and not a broom.—In re Lewis, G. A. 3897 (T. D. 18140).

ACT OF 1897.

Dynamo brushes of metal and used for collecting and transmitting electric currents were held dutiable as articles of metal and not as brushes. In re Michigan Electric Co., G. A. 5390 (T. D. 24593). *Carbon brushes* in litigation under the act of 1909 were not claimed to be dutiable as brushes of the class herein under consideration. They were held dutiable as brushes composed wholly or in chief value of carbon. Abstract 23255 (T. D. 30601).

Dusters composed of a wooden handle to which were attached many strips of woolen cloth, commonly known as "list," were held dutiable as manufactures of wool and not as brushes, brooms, or feather dusters.—In re Melon, G. A. 5551 (T. D. 24937).

Paintbrushes packed in separate cartons in the same case with oil colors in tubes and with water colors in pans, and invoiced separately, were held not dutiable at the rate applicable to the paints, which, with the brushes, did not constitute an entirety in the condition in which they were imported, nor were they dealt in as such. The brushes were accordingly classified separately.—In re Weber, G. A. 6007 (T. D. 26246), distinguishing G. A. 5984 (T. D. 26209), holding boxes of tin or wood containing water color paints, porcelain dishes, and three small brushes, dutiable as entireties, because dealt in by the trade exclusively as paints.

Buffing sticks, composed of a strip of pine upon which was fastened a piece of leather, leather of chief value, were held dutiable as manufactures of leather and not as brushes.—In re Sheldon, G. A. 6656 (T. D. 28383).

ACT OF 1909.

Round wooden sticks about 18 inches long, having at one end a whisk effect produced by small shavings of the stick turned down and bound together, were held dutiable as manufactures of wood and not as brushes or brooms.—United States v. Sheldon. 4 Ct. Cust. Appls., 330 (T. D. 33524), affirming Abstract 30952 (T. D. 33055).

Twigs of willow, closely bound together in bunches securely fastened at one end, and of substantial strength and apparent durability, were held to be of a class of brushes known as whisk brooms and not dutiable as manufactures of wood.—United States v. Swedish Produce Co., 4 Ct. Cust. Appls. 331 (T. D. 33525), reversing Abstracts 31031 (T. D. 33088) and 31380 (T. D. 33217).

A hair brush fitted with a compartment holding a comb, pyroxylin in chief value, was held dutiable as an article in chief value of pyroxylin under paragraph 17 and not as a brush.—In re Langsdorf, Abstract 37676.

*Clarinet cleaners, consisting of twisted wire and yarn or threads running nearly at right angles with the wire, were held dutiable as brushes.—Dept. order, T. D. 32512. (See flute swabs under act of 1894. *supra*.)*

ACT OF 1913.

Brass scratch brushes used for polishing gold and jewelry, were held to be within the provision for brushes of all kinds and not dutiable as wire under paragraph 114.—In re Worthington, Abstract 36472 (T. D. 34763).

A patent rotary wire brush, 92 inches in length and with four rows composed of phosphor bronze bristles 1 inch wide projecting three-fourths of an inch, set spirally in a wooden stock 4 inches in diameter, with a shaft 1½ inches in diameter projecting 12 inches, used in connection with an apparatus for cleaning the Fourdrinier wire of a paper-making

machine, was held to be a brush within the meaning of paragraph 336.—In re Castle, Abstract 37023 (T. D. 34984).

Bamboo strips about one-eighth of an inch wide and 6½ inches long, tightly tied together at one end with similar bamboo or with rattan strips, were held by the Board of General Appraisers dutiable as brooms under paragraph 336 and not as brushes.—In re Cowen, Heineberg Co., Abstract 38158. This decision, however, was not acquiesced in by the Treasury Department which instructed collectors to assess duty on such merchandise as brushes. Dept. order, T. D. 35696.

Brushes for bottle-washing machines were held dutiable as brushes and not as a part of the machines with which they were imported as entireties.—In re Wirth, Abstract 38221.

An oval rubber mat in which was set with glue, cement, or other adhesive material, bristles of the length and character of those in a hairbrush, and intended to be glued into a wooden handle, thus constituting a hairbrush, was held to fall within the provision for brushes of all kinds, directly or by similitude, and not dutiable as an unenumerated manufactured article.—In re Borgfeldt, Abstract 40862.

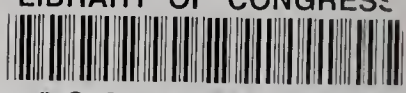
DRAWBACK ALLOWANCES ON BRUSHES UNDER TARIFF ACT OF 1913.

Brushes manufactured by the Standard Brush Co., of New Hartford, Conn., with the use of imported bristles.—T. D. 35635.

Brushes manufactured by the Ames-Bonner Co., of Toledo, Ohio, with the use of imported bristles.—T. D. 37194, Par. A.

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