

# SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXXVIII.—No. 23.  
[NEW SERIES.]

NEW YORK, JUNE 8, 1878.

[\$3.20 per Annum.  
[POSTAGE PREPAID.]

## BRUSH MAKING BY MACHINERY.

The manufacture of brushes of all kinds, by special machinery, is based on the use of that wonderfully ingenious apparatus known as the Woodbury brush machine. Of this we published a complete illustrated description six years ago, since which time the device has been exhibited at various fairs, and has become widely known. About three years ago it was brought into direct industrial use in the brush factory of the Woodbury Brothers, its inventors, in this city, and it is in this connection that we especially revert to the machine, together with the ingenious appliances by which, at the present time, its work is supplemented.

The engravings, to which we devote our initial page, represent the various processes of brush making, and these we shall describe in due order.

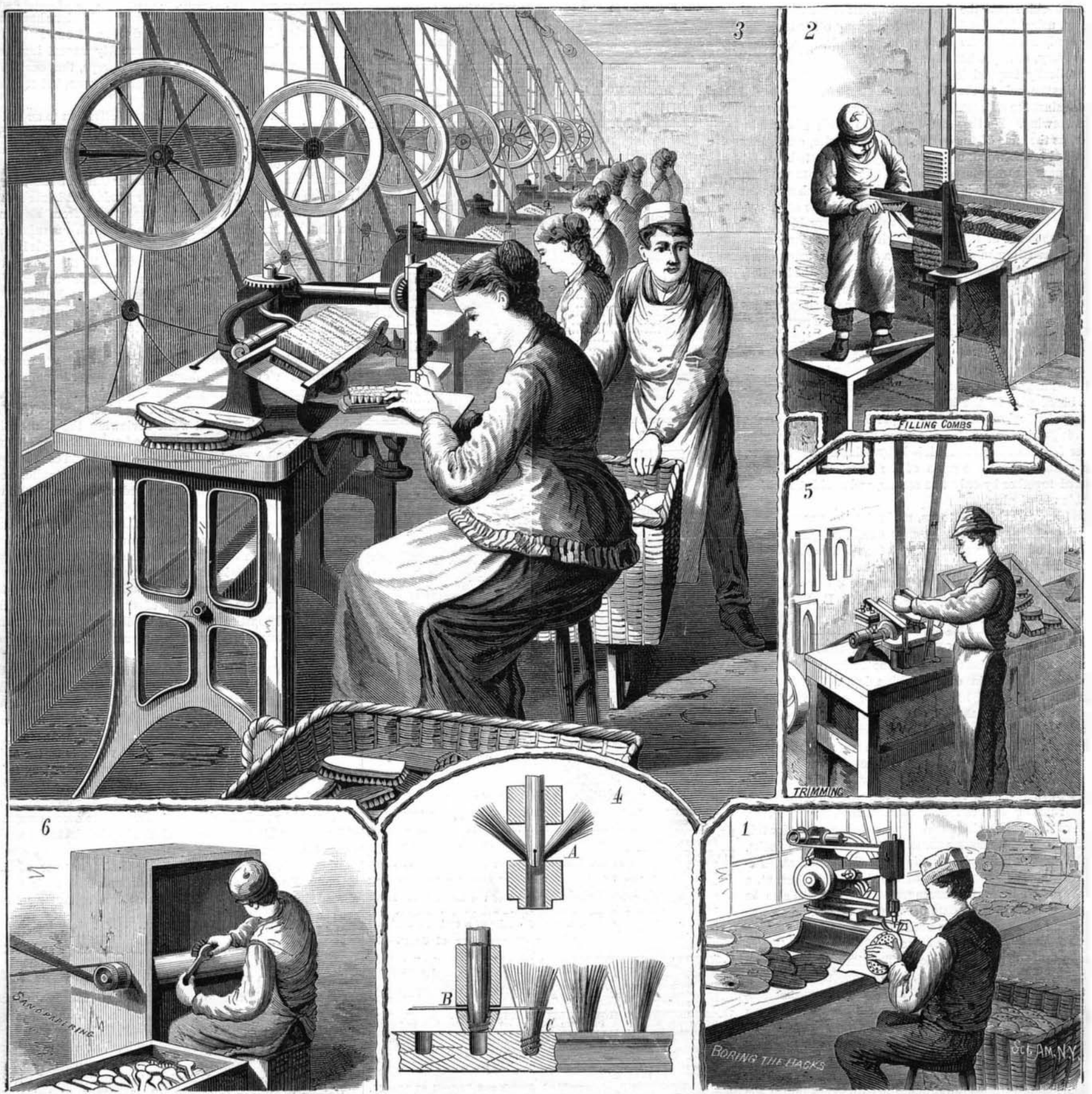
In order to perceive wherein this mode of brush manufacture differs from the ordinary process, it must be remem-

bered that the latter consists in boring a taper or counter bored hole entirely through the block which holds the bristles or hair. The tufts are then drawn or sewn into these holes by means of a wire looped through from the back, and the latter portion is afterwards secured by nails, screws, or glue. Of course if this back comes off the wires are exposed, hence become liable to be broken or corroded, and the brush soon becomes useless. In the present system of manufacture, the blocks which hold the bristles are solid, and no backs are fastened on, the bristles being inserted in holes bored only partially through the wood, and there secured by the action of the machine. Hence the component parts of a scrubbing brush, for example, consist in the solid back, the bristles or similar material, and the binding wire.

The backs are received at the factory already made into proper shape, and the positions of the holes to be made in each block are all marked at once by the action of a stamp-

ing press. The backs are then bored, and for this purpose an ingenious little machine, represented in Fig. 1, is used. This consists of a two-spurred bit of suitable size, which is rotated very rapidly and which sinks the holes as fast as the back can be adjusted, the latter being facilitated by a hooked arm, the bent end of which, inserted in a punch mark, draws the back just far enough forward to bring it in position under the bit to have the succeeding aperture made. One machine of this kind easily bores from 50,000 to 60,000 holes per day.

After being bored, the backs are ready for filling, but meanwhile the bristles, by means of the apparatus represented in Fig. 2, are placed between the teeth of the large metal combs, in which they are held ready for the action of the machine. Simply taking a bunch of bristles in his hand, the workman spreads it out, and quickly adjusts it between sidewise projecting bars. A downward pressure on a treadle



BRUSH MAKING BY MACHINERY.

causes the bristles to be caught and drawn in between two teeth of the comb, filling the space. The comb then descends, and another supply of bristles is carried in between the next pair of teeth, and thus the operation progresses until the comb is full.

Brush backs and bristles are now ready to be put together, and here begins the work of the principal machine (Fig. 3), most of the working parts of which are sustained by an overhanging arm upon an adjustable table. The comb filled with bristles being placed in position on guides, and the machine set in operation, the bristles are seized by teeth and forced through a spiral passageway, and so turned that they rest against a guide. A point divides a sufficient quantity to form one bunch or tuft. Below this point is a wedge which moves the bunch to a position directly over a tube and beneath a grooved and slotted plunger, A, Fig. 4, which descends upon the center of the bunch and forces it into the tube, doubling the bristles so that they lie in the grooves of the plunger. At the lower part of this tube is a nut having spiral threads within it. This nut is pierced with holes, and when the doubled bunch of bristles reaches the nut, a wire, moved by automatic feed from a reel, is thrust through the nut and folded in the bristles, and then cut off to the required length.

The plunger tube, nut, and inclosed bristles, B, now descend to the stock or block previously pierced with holes to receive the bunches. The block is sustained by an adjustable plate, and is brought to its proper position by a finder or guide. As soon as the nut reaches the block the plunger turns and twists the wire around the bunch into the spiral grooves, which screw the bunch of bristles through the nut into the holes in the stock, as shown at C. These movements are effected so rapidly that sixty bunches can be inserted in one minute. The movements are entirely automatic.

The machine sets the finest or coarsest stock with equal facility, using bristles, hair, tampico, or any other material, and firmly securing the bunches in wood, leather, rubber, bone, ivory, or any other material used for brush backs. It is practically impossible to remove the bunches from the backs, as the ends of the wire after the same has been coiled about against the adjacent material, and prevent any attempt at unscrewing. Neither are brushes so made affected by water, as the ends of the bunches, with the wire, are tightly imbedded in the wood, and so thoroughly protected.

The next process is trimming of the bristles to uniform length (Fig. 5). This is done by holding the brush against a revolving cylinder on which curved knife blades are longitudinally disposed. Above is a curved stationary blade, and between the edge of this and the swiftly rotating knives the bunches are trimmed at the rate of a gross of brushes every ten minutes. The last operation is sand papering the handles, as shown in Fig. 6, preparing them for the final varnishing or other finish. The sandpapering machine is simply a revolving cylinder, covered with suitable abrasive material.

There are other contrivances in the factory of the Messrs. Woodbury, designed to facilitate brush making operations or to improve the product, all of which are very ingenious. A neat little contrivance, for example, is provided for inserting a bit of wire in the back of a blacking brush handle. This projection, when the round portion or dabber of the brush is put in place, enters the wood back and prevents the dabber from turning when it is held by a single central screw. This enables the three parts of the brush to be securely fastened together by only two screws, and avoids the objectionable use of glue.

The brushes exhibited to us, made by the processes we have described, were of uniformly excellent quality, fine finish, and of much greater strength than brushes formed in the ordinary way. They are now on the market, and further particulars relative to them may be obtained by addressing Messrs. Woodbury Brothers, 103 East Houston street, New York city.

Prosperity of Barrow, England.

Great extension is being made in the docks at Barrow. A new dock, 200 acres in extent, with a depth of 30 feet and an entrance width of 100 feet, is being constructed, and when finished will be the largest dock in the country. The basin of this dock, 7 1/2 acres in extent, has been completed, and the engineers are now filling it with water by means of a siphon. It will be ready for commerce in two or three months, and so soon as it is opened a new line of steamships, owned by a company formed for the purpose, will commence running between Galveston, Texas, and Barrow, with live stock. Special steamships are being fitted for this trade, and slaughter houses are to be erected near the docks, and the meat will find its way into the dead market. According to the new regulations of the Act of Parliament, a new line of transatlantic passenger steamships will also be inaugurated at an early date between Barrow and North America, under the auspices of the Barrow Steamship Company, which already possesses five 4,000 ton steamships engaged in the Anchor line service. The timber trade, which is largely carried on at Barrow, is to be greatly developed, and the promoters of the new docks have made special provision in this direction. The channel and harbor have been dredged to a great depth, and now operations are going on with a view to the removal of Peel Bar, at the entrance to the harbor, which, when completed, will allow large vessels to enter the harbor even at low water. Barrow is making rapid strides towards as important a maritime position as she holds in manufactures.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included \$3 20
One copy, six months, postage included 1 60
Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.
Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents. Remit by postal order. Address

MUNN & CO., 37 Park Row, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly; every number contains 16 octavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses, as desired. The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade, may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

VOL. XXXVIII., No. 23. [NEW SERIES.] Thirty-third Year.

NEW YORK, SATURDAY, JUNE 8, 1878.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as American productions abroad, Lamp burner, Lungen's, Locomotive, long run, Meat and beer for Europe, Moon, remarkable picture, Paris Exhibition building, Patent Office decisions, Patent system, Swiss testimony, Petroleum exports, Pianos, iron frame, Pulley belts, Pump, rotary force, Razor grinding machinery, Scientific American Export Ed., Shaping machine, Manville's, Sled, Graether's, Sounding the South Atlantic, Stammering for a purpose, St. Gothard tunnel, Swallows and bee bugs, Thirst, effects of, Telephone, the carbon, Trade marks, Tramps, immigrant, Water electrolysis, Welding steel and iron, Wood, fireproof, Workingmen, French.

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 127, For the Week ending June 8, 1878.

Price 10 cents. To be had at this office and of all newsdealers.

I. ENGINEERING AND MECHANICS.—H.M.S. Dreadnaught, the most powerful ironclad in the world. Comparison between the Dreadnaught and the Devastation. The cul-de-sac dispensed with. Height of Bow, Foreboard, Forecastles. Armor, Machinery, Armament, etc., with one engraving. Trial of competitive Shot against Armor. Important Experiments. Chilled Metal Shot. Gruson's, Krupp's, Finspong, Gregorini, Royal Laboratory Service, an Experimental Kind. Steel Shot, Terrene, Noire, Whitworth, Hadfield, Landore, Vicker's, Cammel's Compound Shot. The shot of each maker described and illustrated; How it is Made; Results of Experiments; Descriptions and Engravings of Targets after Trials, and Instructive Comparisons. Ten Figures.—German Patents.—Railway Working Expenses. Testing the Value of Guns by Firing Under Water. By HENRY A. MOTT, JR. Careful Experiments and their Tabulated Results. The Targets, Cartridges, etc. The U. S., the Springfield, the Spanish, the Austrian Service, and other Rifles. Distances, depth of water, effects on targets, etc. Experiments with cartridges, etc., with seven figures.—Improved White Gunpowder.—Memoranda relating to Condensation.—Experiments on Boilers, with results and Formulas.—Albert Borseg.—Physical Society, London.—Modern Blasting Explosives.—History. Gun Cotton, Nitro-glycerine, Tonite. Chemistry of Explosives.—The Huelva Pier. New York Rapid Transit Elevated Railways.—New Railway across the Continent.—Beams. Theory of Strength, with formulae.—Floor Beams.—The Big Iron Production of the U. S.—Fitches for Screws with Angular Threads. Whitworth's size, the Old size, and the New Decimal Standard. Various Building Materials. Limestones, "Blue-Lias," Roestones, Chemical Reactions in Making Mortar. Portland Cement, Chilmark Stone, Caen Stone, Marbles. Alabaster or Gypsum, Magnesian Limestones, Slates. Their Varieties, Specific Gravities, Chemical Analyses, Durability, Geological Relations, where Found, Uses, and other Practical Information.—New Brick Kiln. II. TECHNOLOGY.—Photography of the Red.—Metropolitan Stenches.—The Commune Scare. III. FRENCH INTERNATIONAL EXPOSITION.—M. Giffard's Monster Balloon. Its Size, Construction, Weight, etc., with four figures. IV. ELECTRICITY, LIGHT, HEAT, ETC.—Recent Remarkable Improvements, applicable to the Telephone. The Measurement of Heat. Edison's Carbon Telephone. Successful operation between New York and Philadelphia. Mr. Thomas A. Edison's Improvement in the Telephone, which increases the power of the instrument. Three figures.—The Hughes Telephone. A Marvelously Sensitive Apparatus. Inaudible Sounds Made Audible. The footfalls of a common house-fly heard. Two figures.—Telegraph Experiments.—Crystals. Transpiration of Gases.—The New System of Numbering Spectacle Lenses. V. MEDICINE AND HYGIENE.—The Art of Preserving the Eye-sight. No. 2. The Phenomena of Vision. Properties of Light; Absorption, Refraction, and Reflection. Lenses. Chromatic Effects of Cones. Inversion of Image. Adjustment of the Eye to varying Distances. Spherical Aberration. The Eye a Camera Obscura, 15 figures.—Acid of the Gastric Juice. VI. AGRICULTURE, HORTICULTURE, ETC.—Wheat. By W. CARRETTUS. F. S. A Parasitic Fungus on Rye, Timothy, and other Grasses. Growth, Appearance, and Propagation of the Ergot. Destruction to Cattle caused by it, 4 figures.—The Catalpa. Its Value to Farmers. Cultivation and Propagation.—Belgian Opinions on English Short-Horns. An account of the investigations of a party of Belgian stock raisers.—Brood Mares and Foals. Ailments and Remedies.—Prospects of the Silk Crop. VII. CHESS RECORD.—Biographical Sketch and Portrait of Miss M. Rudge, with one of her Problems, and a Game with Mr. F. C. Collins.—Problem by W. A. Shinkman.—Letter Problem.—Chess on the Stage. Dubuque Tourneys Nos. 4 and 5.—Solutions to Problems.

AMERICAN PRODUCTIONS ABROAD.

We directed attention not long ago to the excellent system now carried out by the State Department, whereby our consuls abroad are required to make reports showing the condition of our trade at their several places of residence, and pointing out how the same might perhaps be improved. In connection with what we have already said with regard to the advantages, in the matter of presenting manufactures and inventions, to be gained by representation in the pages of our forthcoming EXPORT EDITION, the notice of manufacturers generally may now be called to some recent special statements of our consuls, as indicating the demand abroad for American productions and the necessity of action to meet the same.

Mr. Alfred E. Lee, Consul General at Frankfort-on-the-Main, says that, "through the reports of European visitors to the Centennial Exposition, our people have established a reputation on this side of the Atlantic as skilled producers, which it is of the highest importance for them to maintain." Frankfort agricultural machine dealers, for example, inform him that American appliances easily outsell those of German make, and among the other articles which manufacturers are counseled to push in that locality are boot and shoe machines, wooden ware, rubber goods, shirtings, prints (there is good chance of successful competition with England in these), watches, lamps, carpenters' tools, paper hangings, and dental instruments.

Our Consul at Nuremberg cites a suggestive instance of a German-American citizen who, residing in this country, recognized a particular form of turbine as just the thing wanted on the small streams of Bavaria, and accordingly he introduced it there with such success that over 400 wheels are now in use. This is but one example of the success which American inventions encounter abroad as soon as their merits become popularly understood. The same correspondent pertinently adds: "After our productions have once had a fair trial, there will be no danger of our losing the foreign markets, and we can reasonably expect increased demand from year to year, provided, always, that our manufacturers do not rest on the laurels already won, but continue to improve in the future as in the past."

Our Consul General at London calls attention to an article in the Times, in which it is "distinctly admitted that American manufactures of tools, locomotive engines, and many other kinds of hardware are now obtained in Canada and Australia almost exclusively from the United States, while it is also stated that not only do we produce at home all the manufactured goods we at one time bought from England, but that we have been able to exclude British manufactures from foreign markets." Leading merchants of Leeds inform our consul there that they "have virtually abandoned the hope of ever again seeing their manufactures exported in large quantities to the United States. . . . England has not only lost an important market, but she has met with an active, shrewd, and powerful competitor, which produces as well as manufactures."

The few instances here cited will serve to indicate roughly the condition of foreign demand for our productions, and the success already attained manifestly due thereto and not to the push of manufacturers themselves. Dr. Grothe, of Berlin, in his important work reviewing the Centennial Exposition, says that "there is spread out in America before the eyes of the observing European a new world of industry, with new forms, new methods of work and traffic, new auxiliaries, and under new aspects and conditions." All that now seems needed is the means for bringing a knowledge of this "new world of industry" into the workshops and factories of the Old World, and this means manufacturers have at their disposal in the EXPORT EDITION of the SCIENTIFIC AMERICAN. Each issue of this periodical will contain nearly 100 large quarto pages, embracing most of the plates of the four preceding numbers of the SCIENTIFIC AMERICAN, and will constitute a splendid illustrated monthly exposition of American inventive and manufacturing genius, which cannot fail to exercise a potent influence upon all foreigners interested in the industrial progress of their nations. The numerous fine engravings embodied in the reading columns will be supplemented by the striking illustrations which advertisers can insert at a very reduced cost in the broad pages especially devoted to their announcements, and these may be still further rendered valuable by the addition of carefully prepared descriptive matter setting forth the particular merits and advantages of the different devices. The circulation of the EXPORT EDITION, the first issue of which will be mailed in June, will extend to every commercial center and important manufacturing district in the world—and this from the outset.

Many enterprising firms, realizing the importance of this EXPORT EDITION as a means of introducing their goods abroad, have secured space in its columns. Among these are the following:

- Baldwin Locomotive Works, Philadelphia, Pa.
H. R. Worthington, New York, Steam Pumps and Water Meters.
Eric City (Pa.) Iron Works, Portable Steam Engines.
Finch & Co., Waynesboro, Pa., Portable Steam Engines.
Rue Manufacturing Co., Philadelphia, Pa., Injectors.
Chalmers, Spence & Co., New York, Tube Cleaners.
Reading Iron Works, Philadelphia, Pa., Wrought Iron Pipes.
Hoopes & Townsend, Philadelphia, Pa., Nuts and Rivets.
Volney W. Mason & Co., Providence, R. I., Hoisting Machinery.