forms that combine delicacy with strength, and to abhor the loading of any structure with material that, performing no useful function, merely adds dead weight, an ultimate source of weakness. The bulkiness which the foreign artisan calls solidity, is to the American an eyesore, especially in machines or other structures which have to be moved, every pound of unneeded "solidity" merely adding to the cost of motive power. And it is not only in the choice of materials—the habit of selecting for each part of a complicated structure the material which will best do the required work-that American workmanship shows itself; but also in skillfully making the most of the materials which nature furnishes. The English wheelwright, for example, wishing a stick of peculiar shape in constructing a carriage, cuts the pieceout of a cultar shape in constructing a carriage, cuts the pieceout of a block, and makes it heavy enough for the service required, letting bulk atone for the loss of tenacity incident to cutting across the grain. The American invents a method of steamacross the grain. The American invents a method of steamacross the grain. The American invents a method of steamacross the grain. The American invents a method of steamacross the grain. The American invents a method of steamacross the grain. The American invents a method of steamacross the grain. ing and bending a straight-grained stick to the shape desired.

The influence of conditions like these is radical; and American carriage building has, therefore, followed its own lines of development, not only in perfecting styles originating abroad, but in creating other styles specially adapted to ing abroad, but in creating other styles specially adapted to the varying requirements of different parts of the country, and the preferences of individual minds untrammeled by fashion or undue deference to established forms and usages. As one of the foremost leaders in the development of this important industry the house of Brewster & Co., of Broome street, may fairly be selected as a representative in this series of illustrations of American industry. For sixty years, Brewster wagons and pleasure carriages have enjoyed an enviable reputation for superior merit; and the influence of this house in furthering the progress of American carriage industry in the directions of artistic taste in construction, mechanical perfection, honest material, and sterling workmanship, has been second to none. The exhibit of this firm at Paris, last summer, was conspicuous for its scope and excellence; and their award of gold medals in competition with the leading carriage makers of Europe is evidence that their high reputation at home and abroad is

The factory and warerooms of Brewster & Co., formerly on Broome street, are now situated on Broadway, extending from 47th to 48th street In this building, a five story structure, 200 by 175 feet, is built every description of pleasure carriages, from the massive four horse drag introduced by Colonel Kane for fashionable coaching, to racing sulkies weighing no more than forty-three pounds. The Brewster wagon is a noted specialty. The firm make also a double suspension carriage hung on eight springs with thorough braces, and a new dog cart, the body of which can be shifted backward or forward without alighting.

To obtain a comprehensive idea of this establishment, one must take the elevator and ascend to the top of the building; thence in gradual descent visit each department, beginning with the body making, continuing with the painting of the bodies and running gear, and ending with the finishing department on the second floor, where the parts of the vehicle are put together and given the finishing touches. Each of these several departments is in charge of a master mechanic, who is permitted a share in the profits of the concern, and held to a strict accountability for the quality of the work under his charge. At the top of our illustration (front page) is given a view of a portion of the designing room, the real birth place of the carriage.

In an establishment like this, largely devoted to the production of carriages to order, stereotyped forms and styles will not always answer. New designs have to be invented to meet the demands of varying individual taste and new requirements arising from local condition and novel uses. These new forms are invented and elaborated in the designing room, where they are finally drawn full size on the blackboard. From the perfected and accepted designs working drawings are made, and the several parts are allotted for construction to skilled mechanics in each department.

At the upper left corner of the illustration is shown a powerful bending machine, in which those portions of the framework requiring curvature are brought to shape. Hickory, ash, elm, oak, and whitewood are used, according to the service the part is to undergo; and the machine gives the desired shape without breaking the grain.

At the lower corner the body of a leather-topped landau is shown in process of construction. When complete, the

is shown in process of construction. When complete, the woodwork of the body is transferred to the blacksmith shop in the basement to be hung and ironed. Here the clang of thirty forges noisily testifies to the industrious activity of the entire establishment.

After ironing, the body is submitted to the inspection of the superintendent, and then taken to an upper floor for painting—an important part of the work, but one calling for no special description here. The testing of the finished carriage is the only scene that breaks the general gravity of the entire process. The first occupants of my lady's carriage are not fashionably dressed, nor are their movements entirely graceful, but the test is a necessary one, and the workmen are solid and nearest at hand for the purpose.

It must not be forgotten that, while they have been leaders in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the art of carriage in the development and perfecting of the finished carriage in the development and perfecting of the finished carriage in the development and perfecting of the finished carriage in the development and perfecting of the finished carriage in the development and perfecting of the finished c

in the development and perfecting of the art of carriage making, Brewster & Co., of Broome street, have always been quick to adopt improvements made by their own workmen or by outside inventors. One of the more recent of the improvements introduced by the firm is the patent rubber cushioned axle, which reduces jolting, and largely increases the safety and durability of the carriage.

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....... One copy, six months, postage included

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

The Scientific American Supplement

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.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid perodical, 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. IF Manufacturers and others who desire to secure foreign trade may have large, and handsom ely 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. XL., No. 6. [New Series.] Thirty-fourth Year.

NEW YORK, SATURDAY, FEBRUARY 8, 1879.

Contents.

(Illustrated articles are marked with an asterisk.)

Air, impure, in sleeping rooms[3]
Antimony in the system [4]
Archeology
Attack submarine
Barometers speroid
Root and shoe heel novel*
Boot and shoe heel, novel* Brain, recuperating the.
Broad froch and stale
Bread, fresh and stale Carriages, manufacture of*
Cement, receipt for [9]
Older antidotal [6]
Cider, artificial [6]
Convention, Social Science
Correspondence, Washington
Eclipse, Solar, of 1880 Education, agricultural
Education, agricultural
Electrotype battery for [8]
Emery mines of Chester Co , Pa .
Exhibition, fishery, International
Forest culture pays
Geological point, doubtful
Gloves, kid, to remove mildew[12]
Gypsum, crude [5]. Harbor of refuge on Pacific Coast Headaches, rest for. Industries, American*
Harbor of refuge on Pacific Coast
Headaches, rest for
Industries, American*
Industry, an American, in China.
Invention, a curious
Inventions, new
Inventions, new agricultural
Inventions, new mechanical
Tron. a large contract for
Iron work, to galvanize [20]
Keen to the point
Iron work, to galvanize [20] Keep to the point Knowledge, vital
Leyden for [19]
Leyden far [19]

sprains, treatment or.
Stove, car, new*.
Studes, solar, Mr. Lockyer's.
Sub-treasury, fortifying the.
Temperatures, spectroscopic.
Toys, machinery for manuf. of.
Trade, American, with Japan.
Trademarks
Train the boys for business.
Trees, teredo-proof.
Wood, cherry, to ebonize [18].

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT No. 162,

For the Week ending February 8, 1879.

Price 10 cents. For sale by all newsdealers.

ENGINEERING AND MECHANICS.—The Sachsenberg Hot Air Engline. Two figures.—American Machinery in England.—The Largest Cam in the World.—War Rockets.

Gun in the World,—War Rockets.

TECHNOLOGY—Improved Milling Machinery and Methods. By
Joseph F. Gent. A Report to the Indiana Millers' Association. The
Yield. Strength and Color. Fine Pulverizing. Temperature for Grinding and Bolting. Why Some Mills cannot Froduce an Iven Grade of
Flour Imperfect Methods of Testing Driving Stones by Loose
Spinules and Self-adjusting Driving-frons. Too much Grinding Surface.
If ow to Furnish a Small Mill. How to bolt Middlings. Purifiers with
a Blast. Recommendation to Farmers to Raise the Bearded Red
Whea s.—Porcelain Rollers for Milling. Two figures.—Faure's Plate
and Sauger Machine. Two figures.—Cross-raising Machine. One Whea s.—Porcelain Rollers for Milling, Two figules.—Faure's Plate and Saucer Machine. One figure.—Cross-raising Machine. One figure.—Woolen Looms in Germany.—Plerrard's Improvement in Comping Machines. One figure.—Plaiting Spun Yarn.

Bromide of Copper. Its Preparation and Peculiarities, and Use in Photography.—Platt's Universal Filter. Two figures.—A New Fruit House.—Australian Sugar

House.—Australian Sugar

CHEMISTRY AND METALLURGY.—Reagent for Carbolic Acid.—
Detection of Indican in Urine.—Nitric Acid in Spring Water.—New
Acidimetric and Alkalimetric Indicator.—Valuation of Zinc Powder.—
Derivative of Pyrogallic Ether. Ignition of Hydrogen by Powdered
Zinc.—Electrolytic Determination of Mercury.

ELECTRICITY, LIGHT, HEAT, ETC.-Lord Rayleigh's "Theory of Sound."

Telephone Calls. By Geo. M. Hopkins. A Valuable and Comtrehensive Paper, including Practical Instructions by Mr Hopkins for Constructing a Simple Telephone Call of his own make, with Half Size Working Drawings, and Description and Illustrations of the Lorenz Telephone Call, and Call Bell and Morse Combination for Telephone Lines. The Instructions for Making are for Two Calls, one for use with, and the other without a battery. The first is a Small Magneto-electric Machine, with Bell att ched, which Works Without a Battery. The Revolving Electro-magnet or Armature does double duty, as it

VI. NATURAL HISTORY, GEOLOGY, ANTHROPOLOGY, ETC —The Lapps at the Garden of Acclimatization, Paris. Distinctions between Lapps and Eskimos. Lappish Manufacture, with 7 figures. The Life of the Lapp; his Tent; his Habits, Food, Clothing, Reinider, Sledge, Superstitions, Relixion, and Sationality, or Government, with Full Length Portraits of Man and Wife, and other figures. Discoveries in Western Caves. Ry Rev. Holtace C. Hover. Silurian Caves. Sub-Carboniferous Caves. The Mammoth Cave. Wyandot Cave. An Important Discovery. Traces of an Ancient Race.

VII. MISCELLANEOUS.—Record of Recent Scientific Publications, giving an impulse to such a movement in the towns where American and English, in Medicine, Chemistry, Mechanics, Engineering, and Industrial Science. New Serials.

KEEP TO THE POINT.

In very much of the talk in Congress and out of it about the proposed amendment of the patent law, there is a tendency on one side to neglect, on the other to adroitly conceal, one vital feature of the entire patent system, namely, that a patent is not a grant of privilege, but a contract on the part of the government to secure to the inventor for a prescribed period a right which exists by virtue of the inventor's creative act.

The sole object of the patent system, as announced in the Constitution, is to promote the progress of science and the useful arts; the only method by which this end is to be gained is by securing, for limited times, to authors and inventors the exclusive right to their respective writings and discoveries. The right is recognized as inherent: Congress is to secure that right for a term of years, on condition of its free surrender at the close of the term. To this test every clause in the proposed amendment should be brought before any time is wasted on the discussion of its general capacity for good or evil. Will it aid in promoting the progress of science and the useful arts? and will it aid in securing to the inventor the exclusive control of his invention?

The experience of this country has been that the surest way to promote progress in the arts is through the encouragement of invention; and that inventions are best encouraged by securing to the inventor his right to his own, at the least expense in time and trouble and money. As Commissioner Hoyt has expressed it: "From the very foundation of this government, it has been its settled policy to secure a just reward to all inventors; and it is to the inflexible maintenance of this policy that we are indebted for the unparalleled advancement which, as a people, we have made in the useful arts. All that is glorious in our past or hopeful in our future is indissolubly linked with that cause of human progress of which the inventors are the preux chevaliers."

That the policy of the nation has been wiser as well as juster than many people (even among the agents of government in Congress, in the courts, and in the Patent Office) have always approved, is only too true. Witness the grievous injustice that has been done to some of the noblest and most beneficent of our inventors in the markets and in the courts; witness the grievous injustice to all inventors threatened in the proposed changes in the law now before Congress; but the constitutional principle remains. Congress has power only to make the inventor's exclusive right secure. Congress has no right under the Constitution to impose needless burdens upon the patentees, or to interfere with the patentee's unrestricted right to the use and profit of his invention after he has surrendered his specification.

That the proposed amendment of the law undertakes in various ways to accomplish both these unjust and impolitic ends has been shown repeatedly in these columns, particularly with reference to sections two and eleven. Indeed the hand of the infringer is so plainly visible in these, and to a less degree in section one and some of the other sections, that the bill should be overwhelmingly defeated unless these features are stricken out. The single fact that the parties chiefly interested in its passage are not inventors, but those who wish to profit by the inventions of others without being called to account therefor, should arouse inventors, and the public so greatly benefited by their labors, to the necessity of bringing public opinion on this important matter to bear forcibly and promptly upon their representatives in Congress. The American patent system is intended to benefit the public, as a whole, through the protection of inventors. The obnoxious features of the proposed amendment are intended to benefit a few, through the protection of infringers, through the limitations of inventors' rights, through the summary confiscations of the inventions of poor men. The choice between the system as it is and as the change would make it, would seem to be an easy one to make by all clear headed and honest men.

THE ESTABLISHMENT OF PUBLIC TOWN LIBRARIES.

At the late Conference of British Librarians in London, the last resolution adopted was, that "the Council be recommended to take all opportunities of influencing public opinion in favor of the Public Libraries Act." The power given by this law of 1851 to towns, annually to raise money by local tax to maintain free libraries, has been very acceptable to the people; and it is an evidence of it that, at the end of twenty-five years, every large town in Lancashire has established one. At the last conference of American librarians also, the same spirit was manifested. A committee was appointed to devise measures for the increase of town libraries, and to report a suitable form of law in respect to them adapted for enactment by those States which have not yet had any law upon the subject. By such action librarians show that they are not discharging their daily duties as mere perfunctory officials, but that they possess at least as much of the emotion of warm benevolence for the common weal as characterizes any other class of public servants. Indeed in the mention which was made in the American conference of the importance of the multiplication of town libraries, the duty of aiding in forming them was frequently alluded to by the speakers as having the dignity of a missionary enterprise. The advancement of this great work cannot justly or successfully be left to depend upon librarians: there are no supernumeraries among them. It must be set in motion by the citizens of individual towns. And we know of no class of persons in the community who can be more efficient in