

[For the Scientific American.]

Wood Bending.

The use of bent wood for an increasing variety of purposes surpasses the knowledge even of those most familiar with its production. It is used in all departments of business and pursuits of life, wherever man and his products are known. It is as ancient as history, and is found among those in the rudest state of barbarianism. Little is known of the most ancient devices for bending wood, but the oldest patented in England is now nearly a century old, and is used there yet for some purposes. The oldest in the United States was used first in 1794 up to 1821, then patented with but little change. In 1813, at the Woolwich Navy Yard, in England, floor timbers, sixteen inches square, for a man-of-war, were bent over an arc of a circle with a radius of four feet. All these devices, as well as almost all others subsequently used, restrained, in some degree, that tendency found in wood to elongate its outer curve when under the operation of bending, the same as is now claimed to be done in apparatus brought as near the state of perfection as the nature of wood and the change of position the particles undergo will admit. The organic structure of all woods of the endogenous or internal growths, and the exogenous or external growths, are similar, and possess the qualities of cohesiveness and compressibility more or less, differing most in the degree or quantity of these two qualities, which make and determine the amount or degree of flexibility and elasticity in any wood. These qualities, with a structure that will admit any fluid agency to thoroughly penetrate and soften its particles, indicate a wood that may be made to assume any curvilinear shape required for practical use. Then only ordinary judgment and skill would be required to operate good wood-bending apparatus successfully, without any loss occurring from breakage of the wood under the operation of bending, but when the wood has not been seasoned or partially seasoned, a trifling loss will occur from breakage caused by the shrinkage that all woods are subject to in the process of seasoning. And in the case of unseasoned bent wood, this shrinkage acts upon the fiber of the outer curve, which is always at the point of tension, if not in an actual state of severe tension, for the reason that in deflecting any substance, but particularly wood, either with or without partial restraint, to oppose tension, the wood is acted upon by two forces, the one a crushing force that fore-shortens and upsets the lesser or inner curve, with a tendency to rupture it laterally, the other a tensile force that stretches and elongates the greater or outer curve, with a tendency to fracture it transversely and lift the fiber, which is the most hurtful and oftener occurs to the product. These two forces are divided by a neutral line more or less removed from either curve in proportion to the amount of restraint employed to oppose the elongation of the outer curve, but when nearest the outer curve the best product is had, because all tension, however little, is injurious to the structure of the wood, arising from separating and drawing out the fiber which can never be made to unite again, as in ductile and malleable substances, and because the crushing or compressing force improves the wood by forcing the fiber into the interstices or cells, and by interlacing and interlocking the fiber, a product is had nearly resembling the knot or knurl, which is difficult to split or cut, even when rupture is indicated.

In order to get the best product of bent wood, the crushing force alone should be used, and it can be if the fiber of the wood be left free to move into the new position in more than one direction from the point of bending, by beginning the curve in the middle of it when the wood is made to assume a long curve first, before taking the shorter curve of the mold, which long curvature starts the fiber throughout the whole wood, and makes more, if not every particle of the wood, accessible to the influence of the softening agent already in

it, and consequently more yielding to the action of the crushing force. This force should be produced and governed by fixed and immovable restraint that should not compress the wood while in its straight form; it should also prevent end expansion and preserve the exact length on the outer curve of the product as that of the wood in its straight condition. This would give a product uniform in density and rigidity throughout its whole length, with the fiber undisturbed on the outer curve, to resist any tendency to change the shape produced. The long curve gradually lessening to the curve of the mold, would amount to double on successive manipulation, and by successive manipulation wood has been compressed into one-third of its primary bulk, with every quality improved to resist decay and wear in use. Nothing can be reasonably urged in support of the popular belief of the necessity to produce or permit tension and elongation in successful wood bending. Tension and elongation are required or permitted only in consequence of the use of imperfect apparatus—elongation is positively indispensable in machines that bend from one end, or in one direction from the point of bending, and that press the wood against the mold with such power as to prevent all movement of the fiber, producing in advance of the point of bending, a wave-like movement among the fibers of the wood, held rigidly confined and straight, until suddenly made to take the curve of the mold. The movement in advance of the bending gradually accumulates a power that resists compression thus attempted, and before the completion of the process, and in order to save the machine or the product, relaxation of restraint is required, and is followed by elongation of the wood, however small it may be. Tension acts upon the fiber, giving a product uneven throughout its whole length, and more liable to change the artificial shape. It is obvious that any augmentation or diminution of restraint during the process, must give just such results, and that the machinery in use for wood bending is far from having reached perfection; there can and will be machinery constructed to bend large timbers for marine and other structures over any arc or curve that will not require a reduction of its bulk, by the compression of the inner curve, to less than one-half its original bulk. All our past experience has shown wood-bending machinery to be most profitably employed in the production of smaller articles, for which there is an unlimited demand that will continue because of the suitability and superiority of bent wood for these purposes.

J. C. MORRIS.

Cincinnati, April, 1858.

Heat of the Approaching Summer.

A report was recently circulated throughout Ireland that Lord Rosse, the celebrated astronomer, had predicted an exceedingly hot summer, and that farmers should prepare for it by putting up sheds to protect their cattle from the scorching beams of *old Sol*. Upon such public rumors connected with the name of so great a man, it is reported that numbers of the Irish farmers were taking measures to erect large cattle sheds in anticipation of a more than tropical summer. To arrest such foolish preparations, Lord Rosse has published a letter, in which he states that he never expressed any opinion about the heat of the season. This affair reminds us of the comet hoax which was so extensively circulated during the early part of last year.

Wine from Missouri.

The *St. Louis News* informs us that eight thousand gallons of Catawba, from the vineyards at Hermann, Mo., lately arrived in St. Louis on its way to Mr. Longworth, of Cincinnati, to be manufactured into sparkling wine. The price paid at the vineyard was \$1.25 per gallon. One grower, M. Poeschel, has realized over five hundred dollars per acre from his vineyard at that place; so it would seem that wine-growing in Missouri is a profitable as well as pleasant occupation.

Can there be a Great Scarcity of Timber in the United States?

ARTICLE I.

MESSRS. EDITORS—Taking, as a citizen, a deep interest in the welfare of the present and future inhabitants of this great commonwealth, I embrace with much pleasure the opportunity of bringing before the readers of your valuable paper, the views of a professional German forester—Charles Bertholdi—on a most important branch of national economy, namely, the culture of trees. Mr. B. recently traveled through the United States, and he treats his subject without any prejudice. He believes that if the present reckless destruction of timber is continued for a number of years longer, the United States will have to bear the disastrous consequences of that destruction. The bases of his conclusions are stubborn facts taken from the history of ancient and modern nations, such as the Persians, Greeks, Romans and Germans. He considers Persia to be one of the most remarkable illustrations of his views, and he says that there are in this protract three periods to be compared. The first is the time anterior to Persia's flourishing as a great empire, when ignorance and recklessness were dominant for the immense destruction of forests and woods; the second period is the time of its prosperity and greatness, when no difficulties were considered great enough to obstruct an extensive cultivation of trees; and the third period—which extends down to the present time—is that of relaxation in efforts to cultivate and preserve timber. During the middle period, even on the very verges of vast deserts where no rivers or brooks existed, every available source of water was used to supply aqueducts for producing the humidity necessary to the growth of trees. The contrast of desolate deserts and timber land impressed the Persians with a natural love for the cultivation of timber. Religious and political law-makers were so wise as to impose on the people a sacred duty of planting and of promoting the plantations of trees, and its fulfillment was shown to be the only way to be blessed in this and in the world to come. Kings and vice kings, or atraps, early in their infancy, were taught this duty. Thus we understand why every wealthy Persian applied his riches to the transformation of barren land into gardens and groves of fruit trees; and Persia, in the time of its might and power, was covered with gardens, woods, parks, and groves, and thereby the Vandalic destructions of former time disappeared. This love of the Persians for woods accompanied them to other countries in their strife for conquest, and when their dominions extended to the Black and Mediterranean Seas, the same laws for the cultivation of trees were maintained. Generally, the Persian kings appointed wood overseers in their new provinces. The Israelites had to petition their conqueror Artaxerxes, the Persian king, for an order commanding the royal overseers of woods to allow them (the Israelites) to take timber from Mount Lebanon, to be used in the construction of their temple at Jerusalem, an account of which is given in the Bible. (Nehemiah, chap. 2.) As many cold parts of Persia were densely populated, there was a large annual consumption of timber.

In Greece there were provinces which were covered with woods, such as the mountainous regions of Tiber, Boetia, and Thessalonica. But in the province of Attica, with an extent of only forty square miles, and a number of inhabitants amounting to half a million, the people had to plant their trees so as to provide for ship and house-building, and even for their mines. Under government care was placed the cultivation of the fig and olive trees, devoted respectively to their deities, Ceres and Mercury. In Greece, too, religious influence was exerted to keep sacred the temple groves, in which only the decayed trees were allowed to be cut down. The only State forest being at a great distance from the city, trees were planted on the adjacent mountains. Almost every village had its woods, which were under the supervision of the government.

Under the rule of the Romans, the stringent laws for the cultivation and preservation of trees much resembled those of Greece, even to the extent of consecrating the groves surrounding their temples. Each farm was generally fenced with woods, which, together with the beautiful fruit and other trees in the gardens within the farms, imparted much beauty to the country residences.

As to Germany, the country was covered with dense forests a long time before the great nations mentioned disappeared from the scene of action; gigantic trees were found in these forests. Already in the seventh century of the Christian era, the increase of population and its need of agricultural productions caused the clearing of forests. But this clearance did not assume so large proportions as might be supposed, as rigid laws were in force to properly limitate the natural instinct of the peasantry for the destruction of woods. In the course of time, however, this regulation became perfectly tyrannical; large forests being in possession of individuals—kings, nobles, and clergy. The first French revolution checked despotism in this direction; but on the other hand, the destruction of forests became at this period so prevailing, that a perfect barrenness of the soil was created in some parts of Germany; and it took many years of hard labor and the expenditure of much money to restore the fertility of these barren mountains, which restoration was also owing to the development of a better and more enlightened public spirit, which counteracted the effect of vile passions and ignorance. At present, in all parts of Germany, laws and regulations for the cultivation of timber are enforced, which laws are unsurpassed in respect of having yielded the greatest possible quantity of wood, and at the same time provided for a most extensive growth in the future.

L. R. BREISACH.

Literary Notices.

A TREATISE UPON THE SALE AND MANAGEMENT OF PATENTS, ETC.—We have received a book bearing this title, having neither the author's or publisher's name attached, but we presume it is the one advertised by Cornwall Brothers, of Hartford, Conn. At any rate it is full of varied and valuable information, and as to what it says upon the subject of its title we see nothing that is not consonant with common sense, and the advice which it gives to inventors is very good. There are some short biographies of eminent inventors at the end of the volume which serve to relieve the business portions of the work.

LIFE THOUGHTS.—Messrs. Phillips, Sampson & Co., of Boston, have sent us a volume, through Messrs. Rudd & Carlton, of New York, bearing the above title. It is made up of brief off-hand ideas and illustrations thrown off by Henry Ward Beecher in the course of his ministry for two years past. They were taken down by a lady in his congregation—Miss Proctor—and are original, acute and oft times exceedingly happy illustrations of great Christian truths. Mr. Beecher is undoubtedly a man of genius, and has an original way of speaking in his mind. He is known as a radical thinker and his views are generally well understood. The "Life Thoughts" bear mainly upon the Christian religion.

PRACTICAL MECHANICS' JOURNAL. Wiley & Halsted, 351 Broadway.—We have received the January, February and March numbers of this useful publication, and perused much of their contents with great interest and satisfaction. They contain descriptions and illustrations of recent patented and other inventions, contributions from able correspondents, and proceedings of scientific societies, in all of which is embraced such matter as cannot fail to be interesting and instructive to the general reader.

ADELE. By Julia Kavanagh. D. Appleton & Co., New York.—The authoress of this pleasing work of fiction is a great and powerful delineator of female character, and she shows her power and truthful appreciation of the motives that govern human action in a marked manner. It is, if not her best book, at least equal to anything she has written, and there is no small praise for it. The story is pretty, the plot interesting, and the whole is well told. No one will waste their time by reading such a book as this in their idle hours.

ART OF HOUSE PAINTING.—This is the title of a very practical little work by S. N. Dodge, No. 189 Chatham street, this city. It contains very useful information relating to the mixing and application of paints, also instructions in graining, to imitate various woods. Opinions arrived at from thirty years observations in painting are given by Mr. Dodge, and his experience seems to bear out the conclusions derived from the experiments of Mr. Ewen, described on page 187, this Vol. SCIENTIFIC AMERICAN.

LITTEL'S LIVING AGE. Littell, Son & Co., Boston; Stanford & Delisser, 637 Broadway, New York.—This well known periodical has just commenced an enlarged series, each number containing eighty pages instead of sixty-four as formerly. We are glad that, for the success of the magazine, the New York publishers have been so judiciously selected. The subscription is only \$6 per annum, and each number is a small library in itself.

THE REASON WHY. Dick & Fitzgerald, New York.—"This is a careful collection of many hundreds of reasons for things which, though generally believed, are imperfectly understood. A book of essays on various subjects. The first essay is on the "English Translations of the Bible," and is deeply interesting and instructive.

BIBLIOTHECA SACRA. Warren F. Draper, Andover, Mass.—The number of this profound theological review for this month contains nine able essays on various subjects. The first essay is on the "English Translations of the Bible," and is deeply interesting and instructive.

HOUSEHOLD WORDS. Conducted by Chas. Dickens, Jansen & Co., New York.—The May number contains many interesting and amusing sketches, the ones entitled "Little Constance's Birthday" and "Civilization in California," being particularly worthy of mention.