COMMON MISTAKES IN HOUSE BUILDING.

A writer in the *American Architect and Building News* has recently directed attention, with considerable truthfulness, to certain mistakes of plan in house building, which too often occur in this country. These mistakes, he says, have their origin outside of the profession of architecture, and are due to the ignorance of those who build. It is certainly reasonable to expect that a person who is about to build should know such simple matters as the number and character of the rooms he will have; yet this is just what many people do not know, and here is where the first mistake is made. People in their ignorance err in wishing too many rooms. Many people, with a desire to imitate the nobleman's mansion, decide to have a jumble of hall, drawing-room, morning-room, dining-room, library, study, boudoir, billiard-room, breakfast-room, music-room, reception-room, and so on; and to these they add others of their own invention, till there is a separate room for the performance of almost every act of daily life. As all this costs, and there is a limit to every man's purse, economy is attained by copying the stone wall of their model in wood and plaster, woodwork in paint, cheapening the foundations, and makingthin walls that keep out neither cold nor wet.

A sensible man in building his house proceeds on a different plan. He wants just such accommodation as he needs, and no more. He knows that for the average American family in good circumstances three principal rooms are sufficient: drawing-room, library, and dining-room—these he has use for. He also needs a hall by which to reach the others, and a vestibule or porch, as a shelter to the hall. He omits the "family sitting-room," knowing that the three other rooms will serve that purpose, and that any room too good for daily use has no right to exist. The habit of keeping shut-up parlors for occasional company is so absurd that it is difficult to give people who practice it credit for common sense.

Another common mistake is the small scale of the kitchen and offices as compared with family rooms. A kitchen, if work is to be well done in it, and the dinner to be well cooked, should not be less than the equivalent of 15 feet square, and should be still larger in a house employing many servants. The communication between the kitchen and offices and the family apartments, and the concealment of the former from public view, are matters which are much neglected. The usual arrangement of placing a butler's pantry between kitchen and dining-room, with doors to both rooms, often directly in line, makes the best possible conveyance for odors from the kitchen to dining-room, and thence to the rest of the house. In the case of a basement kitchen the same result follows from having the basement stairs open instead of inclosed, as they should be. The English manage better: they put next the dining-room sometimes the butler's pantry, but oftener a small serving-room, opening not to the kitchen, but to a passage leading thither; and this passage is made the only means of access from the family rooms to the kitchen and offices, which, if not in the basement, are in a wing under a separate roof from the main building, so that by closing one door (or two at the most) all communication is cut off, and the odors from the kitchen do not annoy the family.

A common thing in country houses, though often omitted in the city, is a servants' staircase. People of small means, who can afford but one servant, insist upon the separate staircase for that one, while many a city family with three or four servants gets along perfectly well without it. This hobby with country people amounts almost to fanaticism. The second staircase, a great convenience in large houses, is out of place in a small one, there being nowhere to put it; to a small family it is unnecessary, and therefore wasteful.

The place of a veranda may seem a thing of small moment; yet it may prove either a great comfort or a great nuisance, according to its position. Most people seem to suppose it should be on the sunny side of a house, where it darkens the rooms, itself being ablaze with light and hot as a furnace. But the object of a veranda is not to keep the light out of the room, because this can be done better by the window hood or shutters, but to afford a cool, sheltered, shady place out of doors for summer use. Hence it should be on the shady side of the house—on that side that is shady in the afternoon. To prevent the rooms behind it being too much shaded they should, if possible, have one or more windows on the side not covered by the veranda; or, if this cannot be, the windows looking upon it should be made very large, and the veranda itself of light construction and painted as light a color as the rest of the house will admit. No one should worry about too much light in the house; there are many days when there cannot be too much, and when there is, it is easy to shut it out.

CHICLE, OR MEXICAN GUM.

The great interest which has for some time past been manifested by technologists in the search for substitutes for India rubber and gutta percha has led Drs. Prochazka and Endemann to undertake the examination of a Mexican product, known in the United States for some years under the name of chicle and sapota. The latter name would imply that the product is derived from one of the many species of the order Sapotaceæ, to which belongs also the tree producing the balata gum. The difference in the manner of obtaining the material is evident from the chemical composition. While balata is an almost pure hydrocarbon, chicle contains, also, the various impurities of the juice from which it is derived. The only description that has been given of this material seems to be that of Mr. J. R. Jackson, who states that it is probably derived from *Chrysophyllum glycyplæum*, of the order sapotaceæ, that it is also known under the names of Mexican gum and rubber juice, and that it resembles gutta percha in appearance, but is more friable and brittle.

The material examined was in the shape of rectangular cakes, of light chocolate color, which was deeper on the surface owing to atmospheric influences. It crumbled between the fingers, but had a certain degree of softness and tenacity, which was more perceptible after heating. Taken into the mouth it disintegrated, united again after chewing, forming a soft plastic mass. The latter quality has made it a favorite material for "chewing gum." On heating, it first evolved a sweet caramel odor, after the disappearance of which there was perceptible the peculiar smell that is generated when caoutchouc or gutta percha is treated in a like manner. Boiled in dilute acids the substance disintegrated, the brown solution containing oxalic acid and saccharine matters. The residue, subsequently boiled with dilute solutions of caustic alkalies, united again, forming a doughy mass. The authors found the following constituents (the figures being approximate): Chicle resin or gum, forming 75 per cent of the crude material; oxalate of lime (with small quantities of sulphate and phosphate), 9 per cent; arabin, about 10 per cent; sugar, about 5 per cent; salts, soluble in water (chloride and sulphate of magnesia, small quantity of potash salts), 0·5 per cent.

As the results of their investigations (which was the subject of a paper read before a recent meeting of the American Chemical Society, of this city) the authors draw the conclusion that chicle is merely the product of direct evaporation of the juice, without attempt at separation, as practiced in the case of gutta percha and India rubber. They have no doubt that by proper treatment of the raw juice a far more valuable product can be obtained than the chicle gum now found in the market. Whether the product, then obtained, will be one similar to gutta percha, balata, or India rubber, must be left to future examination of the raw juice, which, so far, they have been unable to obtain.

THE CAUSE OF CONSUMPTION.

Dr. Rollin R. Gregg, of Buffalo, New York, is confident that he has solved the mystery of consumption. Regular physicians will be apt to say that he has mistaken a condition for a cause; nevertheless we are inclined to think that good may come from the emphasis he lays upon that condition, since it seems calculated to work a beneficial change in the customary treatment of the disease.

Dr. Gregg argues that as the loss of albumen from the blood through the mucous membrane of the kidneys in Bright's disease, rapidly and fatally depletes the system, much more must the more rapid loss of albumen through the mucous membranes of the lungs be serious in all its stages and speedily fatal in its results, if proper measures are not taken to stop such waste before fatal conditions have arisen. The expectorations of consumptives, and all their other catarrhal or mucous discharges from whatever organ, are mostly albumen and a direct loss of so much of this constituent from the blood. It is this wastage which causes the great emaciation characteristic of consumption, and not, he thinks, any failure of the system to assimilate food. And this loss of albumen does mischief not only in robbing the muscles of their proper nutrition, but also in throwing the constituents of the blood into disproportion. The loss of one ounce of albumen destroys nearly a pound of blood for all purposes of healthy nutrition, and leaves in the blood a relative excess of 5¼ ounces of water, 7 ounces of blood corpuscles, 9 grains of fatty matter, 15 grains of fibrin, and 41 grains of salts. These elements in excess act the same as foreign matters in the blood, and disturb the entire economy of the system. Night sweats and dropsy are the result of the excess of water. The blood corpuscles left in excess are decolorized by the too watery blood, and are deposited in the capillaries or smallest blood vessels, where they shrivel and become tuberculous corpuscles, so called; the fatty matters in excess cause the fatty livers and other fatty degenerations attending the disease; the excess of fibrin causes the adhesion of the pleura to the inner surface of the ribs, the heart, or to each other, often among the most serious of the complications of consumption; and, finally, the excess of salts causes calculi, enlargement of the joints, ossifications, and similar morbid developments.

In such cases of consumption as are characterized in their earlier stages by an absence of profuse expectoration, Dr. Gregg would attribute the beginning of the disease to a loss of albumen through some other organ or organs, the shriveled blood corpuscles lodging in the lungs, starting tubercules there and setting up a dry cough, with the resultant irritation of the mucous membrane and outpouring of mucus. From this point of view, there is but one source of hope to the consumptive in any stage of the disease, and that is through the healing of the mucous membranes and the stopping of the waste of albumen. By this means, in the earlier stages of the disease—with all who have not inherited the most feeble constitutions—there is much to hope from judicious treatment.

Whatever may be the primary cause of consumption, it is pretty evident that the mucous discharge which attends the disease and finds relief in expectoration is to be repressed rather than encouraged; and to do this must radically change the usual treatment of the disease, at least in its early stages.

FUMIGATING PAPER.—Apply to bibulous paper a strong ethereal or alcoholic solution of benzoin, tolu, storax, olibanum or labdanum. To burn well the paper should first be impregnated with an aqueous solution of niter and dried.

AMERICAN INDUSTRIES.—NO. 14.

SUSPENSION BRIDGES.

We present our readers with engravings of four of the great suspension bridges of the United States, and give a history of each as furnished by the eminent engineers and constructors, the John A. Roebling's Sons Company, of Trenton, N. J. The fact that this establishment is the largest of its kind in this country, and probably the largest in the world, adds interest and weight to the particulars given below.

THE NIAGARA BRIDGE.

This bridge was constructed by John A. Roebling between the years 1852 and 1865.

It has a span of 821 feet 4 inches between centers of towers. It has two floors, an upper and a lower one, suspended separately to separate cables, but connected with each other by two longitudinal trusses. The railroad track, which is over the roadway, is 245 feet above the river.

The base of the tower at the level of the lower floor measures 60 feet by 20 feet, and is pierced by an arch 19 feet in width, which forms the entrance to the lower bridge. Above the level of the railroad track each tower forms a single column, 60 feet high, which is 15 feet square at the base and 8 feet square at the top.

This bridge has four cables, each 10 inches in diameter, composed of 3,640 wires, No. 9 gauge. The suspenders, 624 in number, are placed 5 feet apart. The floor is further supported by 64 diagonal stays, and there are 56 under floor stays, fastened to the rocks underneath the bridge.

THE COVINGTON AND CINCINNATI BRIDGE.

Work on the Cincinnati Bridge was commenced in September, 1856. The financial crisis of 1857 stopped the work, and owing to the civil war which soon followed work was not resumed again until 1863, and the bridge was completed in 1867. Since January 1st of that year it has formed the great public highway between Covington and Cincinnati. It cost one and a half million of dollars.

This bridge has a single span of 1,057 feet from center to center of towers, and two half spans of 281 feet each. The total length of the bridge, including its approaches, is 2,252 feet. Its height is 103 feet above low water.

The floor of the bridge is composed of a strong wrought iron frame, overlaid with several thicknesses of plank and fastened to the cables by means of suspenders. The suspenders are arranged between the roadway and the sidewalks. The roadway is 20 feet wide, the sidewalks 7 feet each. The whole width of the floor is 36 feet.

The towers rest on timber platforms, 110 feet long, 75 feet wide, and 12 feet high. These platforms are composed of 13 courses of timber. The excavations for the platforms were carried 12 feet below extreme low water mark, where a bed of gravel and coarse sand afforded a good foundation. The bases of the towers are 82 feet long and 52 feet wide. Above the floor of the bridge the tower is divided in two solid shafts, connected above by a semicircular arch. The total elevation of the towers is 230 feet above low water mark. Each tower contains about 400,000 cubic feet of masonry, mostly sandstone from the Buena Vista quarries. The base and upper cornice are of limestone.

The floor is supported by two cables, 12¼ inches in diameter, containing 5,180 No. 9 wires. The cables at a medium temperature have a deflection of 89 feet. The total quantity of wire worked into these cables, including the wrapping, amounts to 1,050,183 pounds.

The principal vertical rigidity of the floor is obtained from the two trusses which separate the roadway from the sidewalks. They are 10 feet high, and are formed of top and bottom chords, connected by vertical posts and diagonal ties. Each chord consists of two 9 inch channel bars, separated by the upright 7 inch I-posts. The flat bars which form the diagonals are 3 inches wide and ⅝ of an inch thick.

The flooring of the roadway consists of three thicknesses of plank, making a total average thickness of 8 inches. The general appearance of the floor is that of an easy curved arch, having its apex in the center of the main span. The grade is from 3 to 4 feet in 100 feet.

THE ALLEGHENY BRIDGE.

This bridge was begun in the year 1858 and finished in the year 1860.

The length of the bridge is 1,037 feet 5 inches, divided into two main spans of 344 feet each, one half span of 117 feet 5 inches, and another half span of 171 feet.

It was built for heavy road travel. The width of the platform is 40 feet, divided into a roadway 20 feet wide, and two sidewalks each 10 feet wide.

It is supported by four cables, of which the two outer ones incline outward from the towers, and the two inner ones incline toward each other, giving lateral stability to the structure. The outer cables, which support the sidewalks, are 4½ inches in diameter, and composed of 666 wires, No. 9 gauge. The inner cables are 7½ inches in diameter, and contain 1,926 wires, No. 9 gauge. The deflection of the cables is 30 feet.

The towers are 45 feet high. They are composed of four inclined cast iron columns, braced together by latticed castings, and crowned with an ornamental cap.

The bridge has two longitudinal iron lattice girders which give it stiffness.

THE EAST RIVER BRIDGE.

The bridge now in process of construction connecting the cities of New York and Brooklyn will have the longest single span of any bridge in the world. The main span will be 1,595 feet 6 inches, and the land spans 930 feet each.