

**SAFE CONSTRUCTION OF BUILDINGS.**

At the last great fire in Boston, some of the modern fireproof structures actually crumbled from intense heat, while iron roofs were gradually expanded until the walls were forced apart, permitting the whole structure to collapse. It is said that 80 per cent of all fires are extinguished where the loss falls below \$100, and where the loss passes this amount the damage is very likely not to stop short of total destruction of the premises and those adjoining. The total loss by fire last year was computed at \$125,000,000; \$75,000,000 representing the loss where fire originated on the premises, and \$50,000,000 the loss that was caused wholly by exposure, that is where fire was communicated from adjoining buildings.

The method of anchoring a building is one of the most important items in its construction, but proper anchoring is very often neglected. The method usually practiced consists of fastening an iron strap to the sides of the joist, and securely building the same into the wall. In case of fire the joist quickly burns through, and, in falling, the metal strap cannot free itself from the wall, and either pulls the wall along, as shown in Fig. 1, or else makes a breach, so fire can pass through to the next building. In addition to this, defective flues ignite the joist ends, and careless builders sometimes permit joists to overlap each other, when resting on a party wall.

The Goetz-Mitchell method of anchoring joists is designed to obviate these serious defects. The falling joists free the anchorage and leave the walls standing.

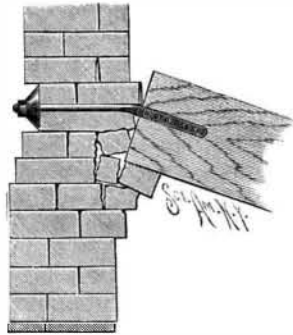


Fig. 1.

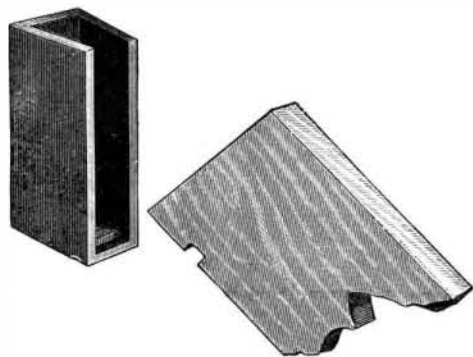


Fig. 2.

By the ventilation provided at the sides, it also prevents the rotting of the ends of the joists. A greater weight upon the beam increases the bondage of this anchor. This joist anchor (see Fig. 2) consists of a dovetail form cast iron box, which is built into the wall, its form securely holding it in position. A notch on the bottom edge of the joist fits over a lug in the box, and thereby forms the tie between the opposite walls. In case of fire, the joists, in falling, free themselves from the lug and have no tendency to pull the walls down. When used on every fifth joist the method costs no more than the old style strap and star. The device can be arranged for iron beams, forming a secure anchorage and also a safe bed plate.

Fig. 3 shows the anchor arranged with air spaces at the sides so as to provide air for the heavy timber ends, preventing dry rot, which is so liable to occur whenever heavy timbers are excluded from the air or covered with air-tight material. Beams are frequently sealed so tightly where they enter the wall that dry rot takes place in the walls while the exposed portion of the beam within the room is entirely sound.

An architect's aim should be to so construct his building that the entire interior of the structure might be destroyed, but without damage to the exterior walls. The Goetz-Mitchell methods are designed to accomplish this; for should the joist upon one side of a building burn and fall, then those upon the other side would be holding the wall in position (see Fig. 4). The main object of the method is to keep the fire and partition walls erect during a fire, for nothing can resist the spread of fire so well as a standing brick wall.

Fig. 5 illustrates another improvement in the way of a timber cap arranged so that any burnt or defective parts can fall out of their respective positions, but without bringing down adjacent parts. The advantages are, they are easily put up, prevent crushing of timbers when loaded, and prevent vibration of building, because the bases of columns are securely fastened. They save 12 inches in length on the long lengths of timbers, and all parts are securely held together, and still any horizontal timber can fall without damage to

the sustaining posts. The cap being bolted to the upper column will carry the horizontal timbers, should the sustaining post be destroyed. Nearly twenty buildings have so far been supplied with the new Goetz-Mitchell anchors. For further particulars address the company, 78 State St., New Albany, Indiana.

**A Successful Case of Transfusion.**

It is always a pleasing duty to have to record examples of devotion to the welfare of their patients on the part of medical men; and although but few such instances are ever recorded, they would, if published, form a long catalogue. Such an instance earned the just encomiums of the *Hull Examiner* in a recent number, where we find mention of the success attending the transfusion in a patient who had apparently been attacked by internal hemorrhage, the operator himself giving the blood. Although, very properly, our lay contemporary does not give the name of the operator who thus distinguished himself for his humanity and skill, there can be no objection to our stating that it was Mr. Robert Hagyard. We are also enabled to give some details of the case. It was one of cancer of the breast, which had been removed ten days before by Mr. Hagyard. While the wound was being dressed the patient was suddenly attacked by syncope. She became pallid and completely collapsed—a condition not to be accounted for by the fact that she was the subject of mitral disease. After the subcutaneous injections of brandy and ether, and the performance of artificial respiration, Mr. Hagyard decided to have recourse to transfusion. This was effected by means of Aveling's apparatus, the blood being taken from his right arm (he is left handed) and injected directly into the patient's veins. It was calculated that more than a pint of blood was transfused, the operation being terminated by the operator becoming faint. The result was most satisfactory, for at the end of ten minutes the patient had completely recovered, and in a few days was able to leave the hospital. The cause of the collapse was thought to be internal hemorrhage, as on the following day the motions were observed to be blackened. There is no doubt that the patient owes her life to Mr. Hagyard's prompt and courageous act, which he had to perform with only the assistance of a nurse. It may be remembered that a similar instance of a surgeon resuscitating a woman suffering from puerperal hemorrhage by transfusing blood from his own arm was recorded a few years back from a Hampshire village; and we may recall the statement of Professor Von Nussbaum (who, we regret to learn, is seriously ill) that he had given blood for this purpose no less than ten times.—*The Lancet*.

**Liquor Decision by the Supreme Court.**

Mr. Christensen, of San Francisco, having for several years kept a liquor saloon in that city, applied for a renewal of his license in 1889, but was refused by the police commissioners on the ground of keeping a place of bad repute. He continued to sell without license, and was arrested, but he appealed to the United States Circuit Court and was discharged on the ground that the liquor law was unconstitutional. This decision the Supreme Court of the United States now overrules, thus maintaining the rights of States and communities to suppress or regulate the sale of liquors for drinking purposes.

In stating the grounds for its decision, the court says that it is undoubtedly true that it is the right of every citizen to pursue any lawful business, subject only to such restrictions as are imposed upon all persons of the same age, sex, or condition, but that the

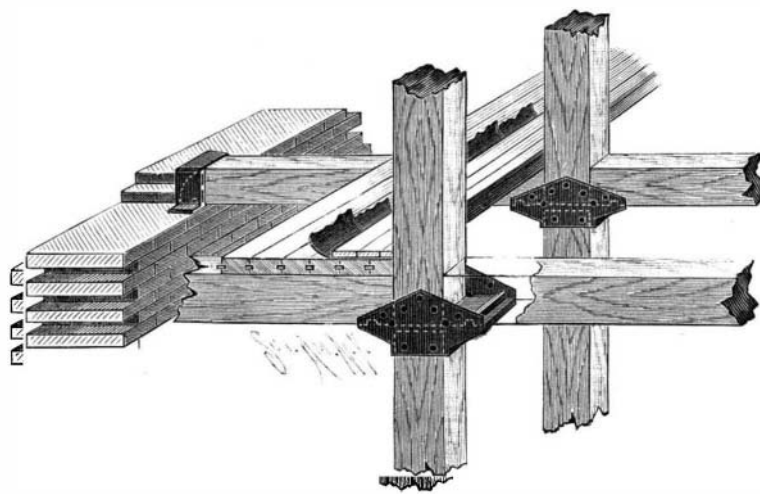


Fig. 5.

possession and enjoyment of this right, and, indeed, of all rights, are subject to such restrictions as may be deemed by the governing authority essential to the safety, health, peace, good order and morals of the community. Even liberty itself, the court says, is not unrestricted license to act according to one's own will, but is only freedom from restraint under conditions essential to the enjoyment of the same right by others. Regulations of the liquor traffic are only a

part of a great body of rules varying with the nature of the businesses regulated, and their validity is to be decided on like general principles. Continuing, the court says:

It is urged that, as the liquors are used as a beverage and the injury following them if taken in excess is voluntarily inflicted and is confined to the party offending, their sale should be without restrictions, the contention being that what a man shall drink equally with what he shall eat is not properly matter for legislation.

There is in this position an assumption of a fact which does not exist, that when the liquors are taken

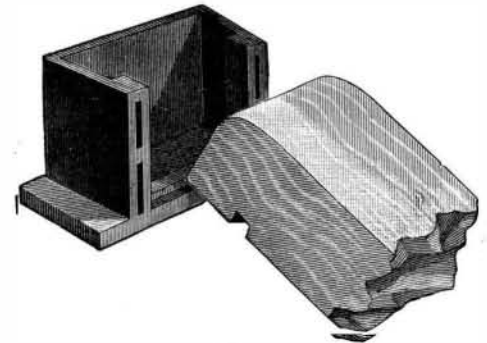


Fig. 3.

in excess the injuries are confined to the party offending. The injury, it is true, first falls upon him in his health, which the habit undermines; in his morals, which it weakens, and in the self-abasement which it creates. But as it leads to neglect of business and waste of property and general demoralization, it affects those who are immediately connected with and dependent upon him. . . . The sale of such liquors in this way [in small quantities to be drunk at the time] has therefore been at all times considered the proper subject of legislative regulation. For that matter, their sale by the glass may be absolutely pro-

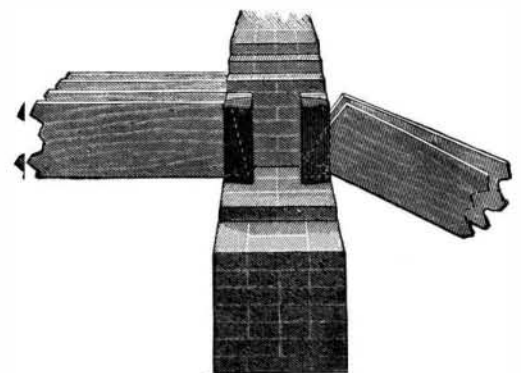


Fig. 4.

hibited. It is a question of public expediency and public morality, and not of federal law.

There is no inherent right of a citizen to sell intoxicating liquors by retail, it is not a privilege of a citizen of the State or of a citizen of the United States. In the prohibition or regulation of the traffic discretion may be vested in officers to decide to whom to grant and to whom to refuse liquor licenses. The officers may not always exercise the power conferred upon them with wisdom or justice to the parties affected, but that is a matter which does not affect the authority of the State, or one which can be brought under the cognizance of the courts of the United States.

**A Mammoth Steel Bridge.**

According to the *Philadelphia Telegraph*, the great steel bridge across the Columbia River, at Vancouver, will be a mammoth concern. It will be 6,000 feet from the Washington to the Oregon shore. It will be double tracked, with a roadway on top for teams, and will be erected upon pneumatic piers. The pivoted pier, or draw pier, will support a draw which will give an opening of 200 feet space on either side for vessels to pass, and the span immediately south of the draw span will be 375 feet. The whole structure is to be of steel, built 10 feet above the high water of 1876, and 40 feet above low water. On account of the sandy formation it will be necessary to go down 80 feet below low water to get a firm foundation. There it rests on a foundation of coarse gravel similar to that upon which the great bridges across the Missouri River are built. This gigantic structure will cost over \$1,000,000 and employ hundreds of men in its erection. It will be January 1, 1892, before the cars can pass over it. The company is pushing its bridge and also its road as fast as men and money and its present perfected plans will permit. They have now between Vancouver and Kalama over 2,000 men and 1,500 teams at work.

THE balloon proposed for polar explorations is ninety-nine feet in diameter and 500,000 cubic feet in volume. The journey will be from Spitzbergen, and with a favorable wind will last four or five days,

**Highest North American Peaks.\***

Among the objects for which the expedition recently organized under the auspices of the Academy of Natural Sciences, of Philadelphia, was dispatched to Mexico was the determination of the physical features of the giant volcanoes of the south, with special reference to a study of the vertical distribution of animal and vegetable forms. While prosecuting our observations in this direction, I took the opportunity, in company with one or more of my associates, of scaling the four loftiest summits of the land; namely, the peak of Orizaba, Popocatepetl, Ixtaccihuatl, and the Nevado de Toluca. This gave me the advantage of making personal comparisons between the life that existed in different regions of "cloud land," at the same time that it offered me the opportunity of more closely investigating the geological features of some of the most gigantic volcanic mountains known to us. Numerous measurements of altitude were made during the ascents, and, in the higher regions, always with the same instrument. This was a registered aneroid, tested and corrected at Philadelphia (immediately before the starting, and shortly after the return of the expedition), at the sea level of Vera Cruz, and in the Central Meteorological Observatory of the city of Mexico, at an elevation of 7,403 feet. To the officers of the latter institution I am indebted for the privilege of making comparisons with the standard mercurial column.

The results of our measurements show a striking accord in some instances with those obtained from earlier measurements, while in other cases they exhibit marked divergence. The fact that all the summits were ascended within a period of three weeks, were measured with the same instrument, and during a period of atmospheric equability which is offered to an unusual degree by a tropical dry season, renders the possibility of errors of any magnitude almost *nil*. At any rate, such errors as may have crept in will probably not affect a general comparative result. The points of important difference are: 1. The highest summit of Mexico is not, as is commonly supposed, Popocatepetl, but the peak of Orizaba (Citlaltepētēl, the "Star Mountain"), which rises 700 feet higher (18,200 feet). 2. Ixtaccihuatl, the familiar "White Woman" of the plain of Anahuac, is but a few hundred feet (about 550) lower than Popocatepetl.

The peak of Orizaba was ascended on the 6th and 7th of April, Popocatepetl on the 16th and 17th of the same month, the Nevado de Toluca on the 21st, and Ixtaccihuatl on the 26th and 27th.

The restoration of the peak of Orizaba to the first place among Mexican mountains, and its increased altitude, open up the interesting question as to what constitutes the culminating point of the North American continent. The only other mountain that need be considered in this connection is St. Elias, situated approximately on the 141st meridian of west longitude, and whose summit is claimed for both the possessions of Great Britain and the United States (Alaska). The measurements of this mountain depart so widely from one another, however, that we are not yet in a position to affirm, even within limits of a thousand feet or considerably more, how nearly it approaches in height the Mexican volcanoes. ANGELO HEILPRIN.

**The Man with a Patent.**

The New York *Sun* relates the following story: "There were only half a dozen people in the palace car all day long, and after dinner, when the man who had been sleeping and reading in seat No. 12 came over to me for a chat, I welcomed him with open arms. He said his name was Saunders, and that he had a patent or improvement on some part of a locomotive. He was going through to Cincinnati to have it perfected or adopted, or something of the sort. He had been in partnership with a mean man—a man who had tried to swindle him out of a fortune. To get even, he had stolen the patent and run away. He had it with him in a valise. That was all he said just then, but later on he confided to me the fact that at a town about 30 miles away this wicked partner of his might possibly be on hand to board the train and attempt to wrest the treasure from his keeping. He wanted my advice, and I offered to take charge of the valise. He thanked me with great effusiveness, and as we approached the town he shut himself into the smoking compartment.

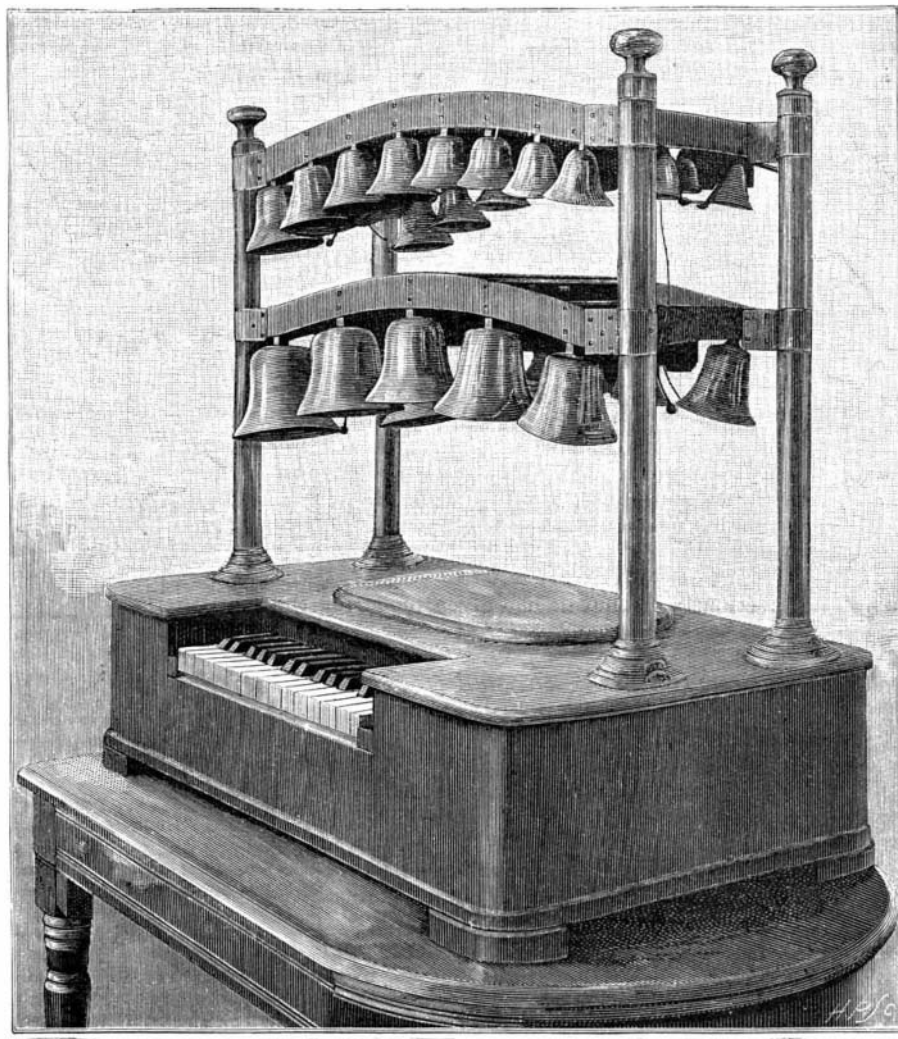
"As the train drew up I saw an old acquaintance on

\*From the proceedings of the Academy of Natural Sciences, of Philadelphia.

the platform, and while we were talking a posse was hunting the train for my friend. They didn't find him, as he had dropped off and struck out for the country. I went on to Cincinnati, taking his valise along, and although I was there four days he didn't show up. I arranged to leave it with the landlord, and it was carried to the office, to be opened by a meddling clerk. Instead of a patent, it contained wedges, drills, a brace, fuse, and other neat little devices for successfully working a burglar's job, and it cost me two days of the hardest kind of talk to satisfy the chief of police that I wasn't in it. I had ridden over 100 miles with a full-fledged burglar, and one who had made his mark, and I must say he was a better talker and more of a gentleman than any governor I ever met."

**ELECTRIC CHIMES.**

Dr. Alva Owens, of Chicago, recently constructed the somewhat unique musical instrument shown in the illustration. The apparatus, which might be described as a set of chimes to be rung by electricity, was designed for advertising purposes. The instrument, it is intended, will be carried through the streets on an electric tricycle and will be played on the trip after the manner of an ordinary piano. The details and operation of the device are so simple as to require



**ELECTRIC CHIMES.**

but little explanation: Attached to each of the thirty bells hung on the rack above the key-board is an electro-magnet. The keys make the circuit from a battery in the base to the electro-magnets at the bells.—*Western Electrician*.

**Iron Ore Discovered by Lightning Strokes.**

Commenting upon a report that a house in Ohio, supposed to be situated over a bed of iron ore, has been struck by lightning eight times within three years, a writer in the *Chicago Journal of Commerce* says: The truth is that all iron ore deposits are not confined to the several well known localities of the United States where they most abound. If careful observation was made, undoubtedly many new fields might be opened up in places where the presence of iron is not suspected. The writer, in his youth, lived on a farm in Southern Wisconsin, on two acres of which lightning had struck, it was estimated, at least forty trees. No sane man could for one moment suppose that the stricken trees of themselves possessed sufficient metallic attraction for the lightning to single them out for destruction. The suggestion made at the time, that underneath these two acres was a bed of iron ore, has never been effaced; yet it is doubtful if ever any other person noticed the peculiarities of that particular plat of ground.

Nature seldom errs in her indications of mineral wealth, and makes electricity a prominent agent in determining the location of iron deposits near the surface. Hence if a forest at any point shows unusual effects of lightning, or if a house becomes a peculiar

attraction for it, it might pay to engage an experienced prospector to develop the hidden ore.

**Selections of Building Materials.**

In preparing plans for a new structure, says the *Carpenter and Joiner*, the most important matter to decide upon is the selection of the material. This, to a large extent, is determined by its cost, but not to so great an extent as might at first be imagined. It is to be taken for granted that an architect will build his structure of the best material his cost limit will permit. Now, this does not mean always the costliest material, although the public are apt to think so; but if the designer be a man of fine taste and well trained in his art, he will select a material that, while essentially durable, will confessedly subserve the best effect. Effect is a prime cause with every architect who has a genuine love for his art, and to a large extent is the dominant feeling in his design, but he still has a wholesome respect for a material that is admittedly substantial and durable.

If the new structure is a public building, he will naturally choose stone in preference to brick for his external walls, because with stone he can obtain a more noble and dignified effect. With stone, too, he can obtain a much more beautiful and permanent color scheme, and if the structure will admit of decoration, he can obtain, more closely, a better interpretation of his designs than is now possible in brick or terracotta. Public buildings demand dignity and repose and simplicity of coloring, and stone, as a material, offers the proper medium of expression. As to stone itself, great care and considerable knowledge of its structure is required to enable an architect to make a proper selection.

Considerations governing the choice of material exist naturally in the purpose of the proposed structure, its geographical location and its situation with respect to adjoining or contiguous structures. In addition to these, a further condition is imposed on its selection by a circumstance which we have reason to believe is seldom thought of, namely, the character of the coal burned in its immediate vicinity. In a district where soft coal is used largely for manufacturing purposes it is impossible to use a coarse, white stone, such as granite, marble or limestone, because soot becomes deposited on its roughened faces, and darkens and ultimately blackens the entire stonework to such an extent as to destroy its original expression. Where the use of soft coal prevails so as to become detrimental to the beauty of stonework, it is necessary to resort to brick and terra cotta work, because they are not injured so readily as stonework. Where granite is to be used it is advisable to employ it in such a manner that it will not be damaged by fire from other buildings. This can be done only by strict isolation, and would relegate granite to isolated public buildings. For office buildings, built close to adjoining structures, it

is evidently quite unsuitable. Granite-faced structures are often built of one uniform tone as to color, and the effect is cold and harsh. This practice has prevailed in the past, but it is gratifying at the present time to observe a marked change in this regard. Dark-colored granites are now used for lower stories, upon which are imposed stories lighter in color as the crowning cornice is approached. This choice is in keeping both with the proper expression of stability and of aerial perspective.

Where brick is chosen for the sake of its inviting field as to color, it is necessary to use the utmost care in selecting not only materials but color. Brickmakers, with good judgment and taste, owing, we believe, to the urgent demands of architects and their clients, have been making marked innovations not only in the color of brick, but in their forms. Bricks 12 inches long, 1½ inch to 1¼ inch face, are now made. Other irregular sizes are obtainable, and in addition to this, rock-faced stonework has been imitated by rough-faced brick. This roughing face is a moulded face, and when used in a climate or locality free from soft coal smoke, it can be used to great advantage. It is a mistake, however, to suppose that artistic brickwork is cheaper than desirable stonework. The choice of either at the same cost is dependent, to a large extent, on the capability of the designer. Some men have a positive talent in designing brickwork which will be exquisite in its refinement of line and its delicate glow of color. In every case permanent effect is the ultimate aim, and can be obtained only by an almost encyclopedic array of information which has been carefully classified and fully studied.