

Science & Mechanics.

INVENTIONS AND SUGGESTIONS FOR THE PREVENTION OF FIRES.

Next to saying "I told you so" there is no mental effort which conveys more unalloyed pleasure to the human race than to calmly suggest and expatiate upon means by which calamities might have been avoided, after such misfortunes have taken place. The recent fire in Boston gives rise to many instances of this fact, and the daily journals are filled with editorials and communications, some conveying excellent ideas worthy of careful attention, others suggesting plans as ridiculous and impossible as can well be imagined. The Chicago fire, though a severe lesson, served but to interrupt our sleep of fancied security; the Boston conflagration has been the means of a thorough arousing of the whole nation; and, as a result, plans innumerable for the avoidance of similar disasters are being devised.

A number of these suggestions, some found drifting about in the columns of periodicals, others obtained directly from their originators, we have gathered together; and below we briefly give their general details.

A word at the outset as to roofs, and in particular the Mansard, which, like Mrs. O'Leary's cow in Chicago, has been the special object of public malediction. The blame should not be placed on the architectural design—no one will deny that the roof is handsome and that its ornate pavilions are a great improvement over the squat coverings of former times—the fault lies in bad material and worse construction; that roofs, if made of thin beams, protected by a single sheeting of tin or slate, would be exactly as unsafe. That we can build or repair roofs on the French plan is amply evidenced by the one in process of construction on the new *Staats Zeitung* building and on the Masonic Temple in this city. A mere glance at the massive iron beams and stone window casings of these edifices will remove all doubts of the structures being dangerous.

The main objection to the Mansard is its height from the ground, but if we provide a proper supply of water and suitable means of forcing it where it is needed, this can be overcome.

Lake Chicago, Boston has demonstrated the value of brick over every other building material, as a fireproof substance, and consequently many of the plans suggested are based on the construction of brick walls.

A daily contemporary editorially says that parapet walls should be placed between the houses, eight or ten feet high, and pierced with a few apertures so arranged as to admit a free play of hose pipe. These partitions are designed not only to check the advance of the flames, but also as barricades behind which the firemen can obtain shelter.

A recent invention consists in building two immense walls of solid brick masonry intersecting in the centre of every block. At the point of intersection the partitions are highest, their upper edges sloping off to the corners of the building. The idea is to confine the fire to one quarter of the square and so prevent its spread.

Another proposition is to carry the walls of a building three feet up above a flat roof, forming a reservoir which is to be flooded with water from below by a force pump.

One of the best plans is that derived from the French, and consists in making all partitions and floors of solid plaster and iron.

A scientific and temporary advocates the construction of partitions analogous to sectional iron boilers. Iron enclosed water spaces are suggested, not to be over one inch in thickness and subjected to a hydraulic pressure of three or four feet head. The sections are to be flooded in case of fire.

Various plans are published having in view increased water facilities. It is proposed to carry river water through the streets in large mains, from which pipes are to extend through the houses and above the roofs, having suitable hose connection in every story, by which, the water being under pressure, a thorough flooding can in a short time be effected.

Another idea is to erect reservoirs on elevated positions into which salt water is to be pumped and distributed by pipes throughout the city.

A very similar device is to build towers along the ridge that forms the backbone of Manhattan Island, and supply fresh water drawn from the Hudson River some distance from its mouth.

In Chicago wells are suggested, which, communicating with the river, are to be sunk at suitable points and an increased quantity of water thus obtained.

Another design, for utilizing salt water, is to locate a powerful pumping engine in every fire district, which, in connection with a large standing pipe, is to maintain such a constant pressure at every hydrant as to obviate the necessity of fire engines.

One excellent idea is the pressing of the ferry boats into service, placing them under the orders of the Chief Engineer and requiring them to carry donkey engines of uniform power, with hose nozzles regulated to a standard gauge. In case of fire, the vessels are to congregate at some fixed point and act in concert in forcing water into the city.

Additional mains from the Croton reservoir are suggested, by which the supply is to be economized by forbidding tapping except in certain localities.

A well-known engineer considers it practicable to force salt water, in time of emergency, through the regular fresh water pipes, which he would have constructed of double their present size.

One of the best devices for the application of

water is that published some time since, in this journal, consisting in a large number of perforated pipes extending entirely through the building. By merely turning a cock, thousands of fine streams are thrown in every room.

A recent invention on this principle consists in permanently affixing a perforated pipe at the summit of the roof, allowing the water to run over the latter, and thence down the side of the building.

A further improvement is a portable system of perforated tubes, which can be readily laid along a roof or rested on supports within the building and thence connected with the engines. This plan has the advantage that the firemen can thoroughly drench buildings even at their highest portions, which otherwise they would be unable to approach on account of the heat.

We have encountered two ingeniously ridiculous ideas. The first is the proposition that our fire department be provided with rolls of thick woollen blankets, sufficient to surround a block of houses. With these the fire is to be smothered by hand, while the cloth is kept wet by the engines. The second inventive genius thinks that a wooden veil, saturated with water and placed between a fierce conflagration and threatened buildings, will instantly avert all danger.

From all the plans, ideas and suggestions above enumerated, and from the experience we have so dearly earned, a few general conclusions may be safely drawn. Of these the chief is that a city to be fireproof needs both properly constructed buildings and a thoroughly efficient water supply. No matter how well organized a fire department may be, if the houses are built of indammable material, disasters greater or less must ensue. And on the other hand, even if edifices be ever so well constructed, if the water supply and its mode of application be not as nearly perfect as can be, similar consequences will follow. In the construction of fireproof buildings, brick should be preferred. Walls should be thick and solid. Avoid hollow partitions and floors of wood or lath and plaster. Employ iron beams and either solid plaster or surfaces of plaster packed with non-conducting and non-inflammable material within. Provide double iron sliding shutters to all windows. Place iron trap doors on the elevator shaft at every story, and thus be able to cut off the immense draft it produces. Introduce a reliable system of perforated pipes or similar devices for sending water throughout the structure, and provide hand fire extinguishers ready for immediate use.

For the high buildings of large cities, steam fire engines have been proved inefficient. Therefore an additional supply of water must be provided, drawn from the rivers, kept under constant pressure capable of throwing the highest necessary stream. The water supply should be so introduced as to be available as furnishing power for elevators, supplying small manufacturers and others, thus enabling them to dispense with steam apparatus and its attendant dangers.

Blowing up buildings with gunpowder is a last resort and should never be left in such unskilful hands as it was at Boston. Fire must be fought by men practised in the warfare, and never delegated to the inexperienced, however willing.

Lastly, in every city in the country is needed a well considered code of municipal regulations in regard to precautions of every kind against fire, enforced by heavy and severe penalties, and in addition, a rigid and efficient system of inspection to see that such regulations are fully observed.—*Scientific American*.

INTERESTING SCIENTIFIC EXPERIMENTS.—Prof Tyndal in one of his Boston lectures, while dwelling upon the effects of polarized light, said: "The study of this branch of optics, leads us into a new world—a world of chromatic beauty. There has been nothing in the past to set beside it but the attraction of gravitation. In these latter days, however, we have a study which may become yet more wonderful—the conversion of energy. He then exhibited plates of selenite of uniform thickness, and it was found that they produced certain definite colours. These plates were arranged as sectors of a circle, each sector being of a different thickness and thus producing a different colour. When the beam was reversed the complement of the first colour was produced. The effect was very fine. He sent the beam through some plates that were so arranged that they produced a fine coloured heart's ease on the screen. Another represented a rooster, with all the shades and tints of colour which that fowl generally wears, and far more brilliant. When the beam was reversed the complementary colours resulted, and a rooster was seen with a green comb and its feathers coloured with red.

The London *Telegraph* gives some details of the extraordinary precautions which have been taken in regard to the preparation of the French meter, which is to be the future standard of international measurement. The learned men appointed by the Academy of Science have decided in favour of the implement actually existing in the archives of Paris. Copies of this standard are to be delicately made, and furnished to the countries which accept it as a common canon. The length of the original is to be taken at the freezing-point; the material of the authenticated copies will be composed of mixed platinum and iridium, and they will be constructed out of the same ingot. They will be heated for many days at a prodigious temperature, so as to be proof, as far as possible, against subsequent molecular action. Each meter will be stored up in company with extremely sensitive thermometers, specially manufactured and tested; and the divisions upon each rod will be marked with micro-machinery constructed for that particular purpose. This might seem needless care, but in reality great

issues depend upon the utmost attainable accuracy in establishing such a standard.

NEW FIREPROOF CONSTRUCTION.—The *Building News* publishes the following description of an invention in which iron or steel, hollow earthenware and concrete or cement are the materials employed in combination. The walls, partitions, floors and roofs are constructed of cells of metal in which are placed earthenware pipes, the sides of which are splayed outward at the base to form a skewback. The pipes and iron flitches are bolted together so as to constitute composite girders. Between each skewback, an earthenware hollow pipe with oval-shaped head and flat soffit, channelled and indented to receive the plaster of ceiling, is placed, with sufficient room left between the composite girders to receive a charge of cement concrete. The upper surface of the floor is levelled and covered with strong cement grout. Holes are left in the soffits of the hollow pipes for ventilation, and the pipes themselves may be utilized to convey warm air through the building. In walls and partitions, the iron and steel lengths are placed in a vertical, in floors, in a horizontal, and in roofs in an angular position. In partitions, wire is used instead of lath to receive the concrete and plaster. The proportions of the concrete are six parts of broken brick, slag and sand, and one of cement, well mixed. The floors are made in one body and not in layers. This method is said to be cheap, to require no skilled labour to construct, to furnish thorough ventilation, and to require comparatively no repairs.

TELEGRAPHING BY SOUND THROUGH WATER.—In 1828 Sturm and Colladon made a series of experiments at Lake Geneva, Switzerland, to determine the rate of transmission of sound through water. The sounds were produced by striking a bell suspended from a boat at a suitable depth in the water, while the observers were stationed in another boat at a distance and received the sonorous impressions through a long metallic tube, the lower end of which was closed by a membrane and immersed at a considerable depth in the water. In these experiments the bell weighed about one hundred and thirty pounds, and the sound was heard at a distance of about 11,000 yards.

During the recent siege of Paris the attempt was made to obtain telegraphic communication with the provinces by this device of transmission of sound through water, and the Minister of Public Works confided the necessary experiments to M. Lucas, who reports the following results:—The experiments were conducted as in the former instance and made in the River Seine. Two bells were employed, one of about eighty pounds and the other of seven hundred pounds weight. In the case of the first the sound was transmitted to a distance of about 1,500 yards, while in the case of the second or larger bell, only to 1,500 yards. There was therefore no advantage gained by the increase in the size of the bell—in fact there was a loss. The great diminution in the distance to which the sound was conveyed in his experiments is accredited by M. Lucas to want of depth in the waters of the Seine as compared with those of Lake Geneva.—*Scribner's*.

The *Standard*, when speaking of a meeting held by the German *Frauentag* at Darmstadt, says: "This is an association formed chiefly to advance the better education of women; and its objects are under the especial care and approval of our own Royal Princesses. There were representatives from several parts of Germany, and from England also; and it seems one excellent feature in their combination, that they address themselves to culture in 'the sensible sense' of the term, without flying up, or rather down, to parliaments, politics, law courts, platforms, and physiology. The delegates of the *Frauentag* confine themselves to desiring a nobler teaching for girls, a clearer knowledge of history, literature, the fine arts, and that science, so rarely occupying the mind of women—geography. They repudiate Utopia, and they will have nothing to do with the empyrean flights of French political economy. They distribute their purposes into two sections: one, the intellectual improvement of their sex in the matter of amusement not less than that of study—which is an important though generally neglected point; and the multiplication, in their favour, of honourable and remunerative employments. The distinctive characteristics of the speeches delivered at the Darmstadt meeting of the *Frauentag* were their clearness and practicality, which were not once lost sight of. In proof, moreover, of the success attending their efforts, it was shown that their industrial bazaars were not so much over-crowded by exhibitors as insufficiently supplied with them, the articles offered for sale being usually disposed of in great part before being exposed. It may be a question whether this system of depending so much upon bazaars, or, in other words, upon fancy-work, is the wisest one to rely upon. But the German friends of female education only profess to be trying experiments."

HOW THE OLD AND INFIRM ARE SUPPORTED BY FELLOWS' COMPOUND SYRUP OF HYPOPHOSPHITES.—During the vigour of youth the expenditure of the power of the mind (which is the real seat of man's strength) is balanced by activity of the nutritive functions, without the aid of science.

But Time, the everlasting dissipator of reason as of events, sets a limit to his power, and it is at this epoch that science may render to man the desired assistance and restore the drain upon his wasted energies.

Each effort of the mind, every act of the body, will extract a volume of nervous element in proportion to the magnitude of the thought or action, and since this Hypophosphites combination really will supply the *vis viva* to the body, it must support the human mechanism successfully after the vigour of youth is past.

Courrier des Dames.

THE HAIR.

The following remarks by a writer in *Harper's Bazar* on coiffures and the use of false hair will be of interest to our lady readers:—

"We are often annoyed by the incapacity to see what is becoming to the face, or the reverse, as well as the utter disregard of anatomy evinced by the perruquiers and their pitifully blind and thoughtless victims. When the style, beautiful and simple in itself, but usually most trying to the face, of wearing all the hair scraped back, and bound into a circle of close plaits behind, came in ten years ago, every woman discarded the shaven net that had been ruining the backs of her dresses for two years, and scraped her hair tight to her skull. She was right to discard the net, but she was mad to force the classic style upon herself, *bon gré mal gré*. The consequence was obvious—hardly one woman in ten looked fit to be seen; for the head must be exceptionally fine, the features exceptionally regular, that can stand this treatment. Let every woman study her face before she dresses her hair, as she studies her feet before she buys her boots.

"If she finds her forehead narrowing above the cheek-bones, let her never fail to insert pads in her hair at the side. If it be a broad forehead, while her face is narrow, let her avoid this style rigidly, *whatever be the fashion*. If her head is slightly flat, plaits across it, or the hair turned over a cushion, are the only alternatives; but if naturally too high, let her give the fullness of hair to other parts. If the head be perfect in shape, still let her disregard the fashion, and make a point of showing a charm that is exceedingly rare. It would be simply waste and ruin to pad it into all sorts of shapes.

"One word against the huge bundles of false hair now worn. Far be it from me to overcondemn the practice of wearing false hair. This fashion will never go out while hair is considered a 'glory' to a woman, and while, through age and other causes, the glory is liable to become 'leached,' and to fall off.

"Moreover, there are cases (since caps are not in use) in which a few bands of extra tresses are more than an improvement—even a necessity; witness a very scanty supply of hair, or hair in patches, on a young head. And the practice is not a dirty one, as has been unjustly asserted, any more than wearing one's own hair. Besides, if one is careful and patient enough to collect it, one need never wear anything but one's own hair.

"But, O women! beware of piling on your heads a greater mass of hair than a human head is able to grow. The huge plaits of three, stuffed and padded, which are so obviously artificial; the mighty cables, half as thick as one's arm, that rise up aloft and swell out behind, till the effect of them merely as a burden, not a beauty, is quite painful to the eye; in addition to rows of ringlets, which in themselves would require the whole head of hair to form them—these debased fashions are a few of the many that detract from the beauty of the head and face, instead of enhancing it, imposed by foolish women on themselves. The eye soon becomes vitiated, and does not perceive, in fact, the vulgar and painful effect that is instantly apparent to another."

A dreadful rumour is abroad. It originated with an eminent French chemist—name not given. But the unknown assures society that many of the new "evening" silks are covered with pirated bits of lead, that, consequently, they are liable to a tremendous explosion at any time, and that gentlemen must take care lest their partners in the dance suddenly blow up.

The Emperor of Germany has lately conferred the Order of the Iron Cross on Mrs. Alsager, the English lady who was nursing in the hospitals of Saarbrück from the commencement of the war, 1870, to January, 1871, a false report of her death having prevented the Inspector of the hospitals there (Dr. Kupper) from sending her name in for the decoration at the time when it was first awarded.

Mr. J. Cordy Jendreson, in his new book on "Brides and Bridals," thinks that the custom of throwing an old shoe after a newly wedded pair represented, first, the hurling of missiles at a man engaged in a forcible capture of a wife, and, later, the transference of authority from the parents to the bridegroom, the shoe or sandal having ever been an instrument of domestic correction.

Somewhere on the Jersey shore there has occurred a marriage of primitive simplicity. It is worthy of note. When the clergyman who had been summoned arrived at the house, he found the expectant bride arrayed in neat homespun, with sleeves rolled up, churning butter. The bridegroom was at work in the fields. He was called in; the twain were made one, and then promptly returned to their respective duties.

The "Infant's Pavilion" will be a notable feature of the Vienna Exposition. Within this pavilion, gathered from all nations, will be grouped the various contrivances used in the care of children. Those that minister to the physical needs, those that amuse and develop the mental faculties, toys and games of all kinds, will find a place there. This is not all. It is the design to present the various plans and systems used in charitable movements for the care of children, and the medical methods and inventions used for remedying physical defects and malformations. The idea of the "Infant's Pavilion" certainly commands itself to the feelings of every one.