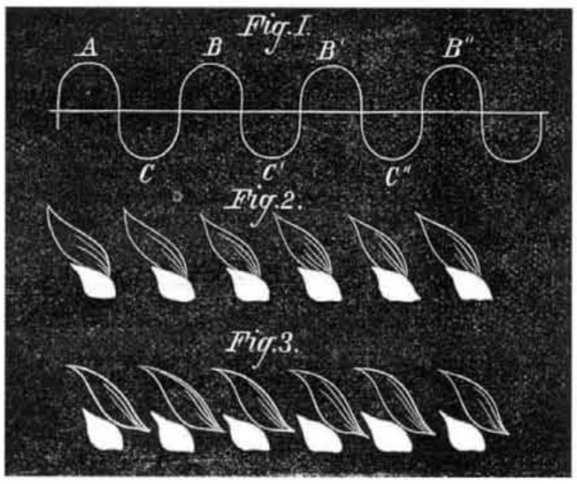
a resonator, a metal globe with a large opening at one pole and a smaller one at the other. It was invented by Professor Helmholtz, of Germany, and will resound to but a single note. Suppose this resonator to be connected with a separate flame by means of a tube containing a membrane, and that this second flame be placed directly beside that first described. If the resonator be held at a distance of a wave length from the organ or the vibrations of A—if, for instance, we hold the resonator at the point B—the two flames will vibrate together, and their reflections in the mirror will be coincident; but if the resonator be placed at point C', moving it further from



A and beyond B, the serrations of its flame will lie between those of the flame from the organ. Moving the resonator still further along to B', the flames will again coincide. Consequently, if we place the resonator as near the organ as possible, and then obtain a coincidence of flames, we shall have determined a wave length which we can actually measure; taking the distance between the organ or point A to resonator or point B for one wave, B' for two waves, and so on. Again, if we carry the resonator one half the distance between A and B, or to C, we shall have the flames intersecting, and the space between organ and resonator will be one half a wave length. To show this fact experimentally, Professor Mayer attached a tube to the small opening in the resonator, and arranged it in connection with a box, in which was a membrane to make a second flame beside the organ flame. The tube measured one meter and a fraction, that being the wave length of the organ as previously determined by the lecturer. The organ being sounded, the flames appeared coincident, as in Fig. 2. The resonator tube was then lengthened half a wave's length, and the flames appeared as in Fig. 3. This was explained very clearly by the fact that, the resonator pipe being the longer of the two, vibrations passing through it would be retarded, and therefore take more time to meet the flame. Professor Mayer went into the elucidation of this phenomenon at some length, so that we are obliged through want of space to omit the process of reasoning by which the above conclusion was attained. Having discovered how to measure a wave length, it is easy to determine a wave surface. A wave surface covers those points around a surrounding body where the air has the same phase of vibration. Now, if instead of holding the resonator still, it be moved around the organ, always keeping the reflected flames in the same relative position, it is evident that all the points through which the resonator passes are positions of the wave surface, which will be found to be an ellipsoid, of which the ends (top and bottom) of the organ pipe are foci. If air is heated, the velocity of sound transmitted therein is increased, its wave length is lengthened. The velocity of sound is determined by the formula:

v (velocity of sound)$=333$ (meters at zero C.) $\sqrt{1+\cdot 00367t}$, t being the temperature.

The decimal ·00367 is the coefficient of the expansion of air under a constant pressure.

The Professor then proceeded to explain the practical application of his discovery. He placed in the furnace a platinum tube, say thirteen meters in length, connected with a resonator. The tube is coiled in convenient form, and is arranged so that the heated air within it does not leave the furnace. Outside an organ pipe is placed, sounding the note UT_4 of 512 vibrations per second. Now if the temperature of the air in the furnace, and also of that around the organ be 0° C., it is plain that the flames acted upon by vibrations from organ and resonator will coincide and the wave lengths are equal. But the temperature in the furnace is becoming increased, and the wave lengths in the metal tube are lengthening, consequently the flames no longer coincide—one set is slowly moving. The furnace is heated a certain number of degrees; another coincidence takes place. Then, if the heat be still increased to 820°, the air in the tube will be expanded to four times its first volume (at 0° C.), and the wave lengths will be doubled. That is, if twenty wave lengths were first contained in the furnace-tube, now but ten will be found; or in other words, ten successive coincidences of flames will have been noted. Therefore, if we count the coincidences and measure the fractions, by the aid of a micrometer, until the flames become stationary, we have exactly the quantity of heat in the furnace which we may determine to 10 degrees Cent.

Professor Mayer concluded his lecture by giving the following formula, in which $t=$ temperature outside the furnace; $t'=$ temperature of air in furnace; $v'=$ velocity of sound corresponding to temperature t'; $l=$ number of wave lengths at temperature t; $d=$ displacement at $t'-t$, $l-d=$ wave lengths in tubes at t'. From (1) and the formula $v'=333\sqrt{1+\cdot 00367t'}$, the formula

$$t'=\left(\frac{v\,l}{20{\cdot}16\,(l-d)}\right)^2-272{\cdot}48 \qquad (2)$$

which gives the temperature. Professor Mayer proposes to develop the theory to its fullest extent, and also to experiment as to the best modes of applying it, in order to render it useful in many industrial pursuits.

CHOOSING AN OCCUPATION FOR A YOUNG MAN.

If a boy is constantly whittling sticks, fond parents say that he has "marked constructive ability;" or if he can whistle one or two notes of an air correctly, "he will be a great musician;" or if he can draw with reasonable accuracy, "that child is a born artist." If these presumed or assumed evidences of genius are acted upon, and those in authority seize arbitrarily upon the young man and force him into a trade or art, on the ground of their being better able to judge than he is for himself, the possibility, nay, the probability is that he will turn out a Harold Skimpole, of whose class the world has far too many already. He sketches a little; tinkers a little with tools; drums a little on a piano; and in time falls into line with the rank and file of the noble army of incompetents and revilers of fate. He may protest with all his strength in his earlier years that he is not fitted for the occupation chosen for him; he may demand to be transferred into some other calling that his soul hungers after; it is all in vain if some one in authority, be the same parent or guardian, says: "Your profession has been chosen for you and you must follow it; your elders have had more experience than you and can tell better, by reason of it, what you need;" and so the young man is condemned for life. He goes moping all his days and refuses to be comforted, simply because his heart is not in what he is doing. He is out of his element; he disturbs the machinery of the world; he is as bad as a broken wheel on a train; everything with which he is connected goes halting and bumping and jumping because of him. If he does not reach the highest place in his profession, his elders, with astonishing inconsistency, upbraid him and say that he has no ambition, no energy, no desire to succeed; when the simple fact is that he has no qualification to command success.

"How *can* I know about a thing I dunno nothing about?" exclaimed an exasperated and badgered witness in the box. "How can I have inspiration to preach when I am always thinking about machinery; or paint, when I am always wishing to preach, when divine truths fire my heart to go forth and turn men from the error of their ways?" A man out of his place says these things at heart if not in actual words, and his whole life is embittered by the blindness of his elders who would not see, but claimed the right, because they had the power, to squeeze a human heart into the corner they thought it should fill. For it is crushing the heart out of the man to make the boy travel in a circuit he is unfitted for. All his energies and ambition reach forward to one goal; all his nature is bent upon that one thing, and because you cannot see as he sees, oh parent or guardian! because you are not him and do not love it as he loves it, you destroy his future power. It is a serious responsibility to assume: to direct the calling in life a young man shall follow, an action to be taken only upon great deliberation. Whatever he undertakes he must stick to. In the early years of his life, when the world expects but little of him, he must study or work hard to be qualified for the later ones, when it exacts a great deal. He cannot be always young; he cannot have two youths; he must give his young life, his bright hopes, his aspirations to the work in hand. What if his heart is far from it and he is longing with all his strength for that other calling which you have put out of his reach? You might as well go out into the world when he is of age, as some foreign parents do, and select a wife for him. With equal consistency you might say: "I have had more experience in the world than you; you can live happier with this woman than one of your own choosing," yet this is an action you would shrink from committing. Is not a man's profession the same in degree as his wife? Does he not live by it as with her? Are not all his hopes centered upon it, his happiness bound up in it? Is not the contentment which springs from a congenial occupation in some respect the same as connubial affection? It certainly is; for unless a man love the work to which he applies himself his labor is of no force, of little worth. He is half hearted, simply because he lacks the inspiration which enthusiasm lends to every occupation, even the humblest. The shoemaker who likes to make shoes makes better ones than the convict enforced to do so, and the same is true of every work under the sun.

Let every young man choose his own occupation in life. In any event, let him choose it. If he has no particular bias or bent, let him find something to do, all the same. A parent or guardian may say: "My son, it appears to me that your walk in life lies this way," and point out the advantages likely to accrue or that can be absolutely given him if he adopts the suggestion, but this is all that should be done. If he revolts, or objects and says "I cannot," do not retort with "you shall, or you are no son of mine." You will live to repent it. You will wear sackcloth and ashes for it. Humble yourself a little before you overthrow him. A boy has a right to his choice. He has an inalienable natural right—yea, a constitutional one—to "life, liberty, and the pursuit of happiness." Words mean something, and the choice of an occupation embraces all of these. How can you force a boy into a workshop to learn a trade when he has no aptness whatever for it, except that he has been seen to make boats, or kites, things that a child naturally amuses himself by? You cannot; you have no right. Consider the matter somewhat. If he is a tractable, affectionate, and docile boy, so much the worse; you use his natural affection as a vehicle to work your will with him, not seeing that in after life he will become a listless, moody, inefficient laborer in the vineyard, because you have trained him to a stake, or spread him on a wall, instead of allowing him to grow free and unfettered as he should. Consider this matter in some other light than your own inclinations. He will doubtless live many years after you are gone. How shall he best perpetuate your name and family? By following his own natural inclinations, or by trying to force his nature to run on a track too wide or too narrow gage for him? Think over it!

THE LATEST DISCOVERIES IN THE POLAR REGIONS.

Although the North Pole has not yet been reached, notable progress has recently been made in the exploration of the zone of which it is the center. During the past summer several voyages have been accomplished; and of the results thereby determined, we are now beginning to learn the first particulars.

Dr. Augustus Petermann, the eminent German geographer, has received advices, *viâ* Norway, that the land at the east of the islands of Spitzbergen, of which the position has frequently changed on the charts during the past two centuries, has at last been reached, and that, during the month of August last, it was thoroughly explored by Captain Nils Johnsen, of Tromsoe. Another Norwegian captain, Altmann of Hammerfest, although reaching the same locality, failed to make observations of any importance, so that it was reserved for Captain Johnsen to complete the work. He left Tromsoe for the fisheries of Nova Zembla in the yacht Lydiana with a crew of nine men. At the beginning of June, says Dr. Petermann, he shaped his course toward the western part of the vast sea which extends between the islands of Spitzbergen and Nova Zembla. During the latter part of the same month he arrived some 80 kilometers to the south east of the Ryk Is islands (a little group off the east coast of Spitzbergen) and in the midst of a great polar current that transports enormous quantities of ice toward the eastern shores of the Spitzbergen and Bären Islands. In the following July and August, the ice current turned more to the eastward, leaving the western half of the sea comparatively clear. Captain Johnsen, who meantime was making large hauls of fish on the great Spitzbergen banks, suddenly discovered on the afternoon of the 16th of August that he had been carried to over 78° north latitude, and shortly after perceived the land which it is believed appears on the charts of 1617 under the name of Wiche or Gillis Land. Finding the sea open on the east and southeast shores of this island, Johnsen anchored his vessel near the northeast point, at latitude about 79° north, and disembarked in order to explore the surroundings, to ascend a mountain near the coast, and also to obtain a supply of the wood which he saw in enormous quantities on the beach. The main island he found to be accompanied by others smaller in extent. On no portion of the land could extended snowfields be seen. One glacier was visible on the southeast coast, while numerous streams of clear water were apparent.

The length of the island between its furthest points was determined to be 44 marine miles. The drift wood had accumulated in vast heaps, hundreds of feet from the shore and as high as twenty feet above the sea level. The principal animals inhabiting the polar regions were observed, and especially the Greenland seal, which appeared in immense numbers. The explorers evince considerable surprise at the reindeer, which they state are fatter and larger in size than any they had ever seen. On the back of one of these animals, fat was found of over three inches in thickness. Specimens of argillaceous and quartziferous rock were collected and, with some fossil vegetation, forwarded to museums in Europe for examination. On the evening of the 17th of August, Johnsen departed, following the southern and south eastern shores of the island. There was no ice except on the north coast, while in a northeasterly direction the sea was open as far as the eye could reach. Regarding the Austrian expedition of Payer and Wieprecht, we have news as late as the 16th of August. At that date the expedition was near the Isle of Barentz 70° 7' north latitude and 58° 24' longitude east of Paris. There is little of novelty communicated other than that the temperature of the sea, as taken, verifies the figures adopted by Dr. Petermann, on the charts. "Much thick ice has been encountered" says M. Payer, "but with the aid of steam we have no difficulty in penetrating it."

IMPROVEMENTS IN THE MANUFACTURE OF SILK.

In a report to the *Société d'Encouragement*, in Paris, M. Alcan lately gave an account of some recent improvements in the production and manufacture of silk. Among the various branches of this industry are the rearing of the silkworm, the collection of the cocoons, the filature or reeling of the raw silk, the spinning, the utilization of various waste products, and the dyeing and weaving of the threads in their manifold stages from the singles, trams and organzines to the finished silk tissues. Moreover, there belongs to the silk industry the obtaining of the silk substance from the body of the worms and its use for fish lines and violin strings. Recently the regaining of the silk fiber from the silken rags has been added to it; and in regard to this, we would say that it is more important than the shoddy industry, inasmuch as the silk threads regained possess a proportionally higher value than shoddy, because, when used again, they differ less from the new material which is mixed with them.

Of these various branches, we will first allude to the killing of the worms. The most preferable method would undoubtedly be that in which hot air is the means, were it not

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for the fact that the contrivances used for the purpose are still very defective. Hence, steam is mostly employed, and this process is easy and inexpensive. Yet there is one disadvantage connected with it, as the cocoons absorb moisture; and if not dried with the utmost care, they require afterwards to be turned over several times a day to prevent their loss by decay. In foreign silk growing countries, much care is bestowed upon this branch of the art. In China, for instance, they use *calorifères*, specially built in Paris with great care. To facilitate transportation, the cocoons are treated in hydraulic presses, whereby spots will most assuredly show themselves if the dead worms have not been perfectly dry. In order to simplify this process, Alcan conceived the idea of employing a volatile substance (camphor) which he did in the following manner: Thirty pounds of cocoons, which were to be sent from southern France to Paris, were packed into a box with a small quantity of camphor, all the cracks having been carefully closed by pasting strips of paper over them. Although forwarded at a time most favorable to the metamorphosis, not a single butterfly was found on opening the box; all the cocoons were saved, and the worms had assumed a mummy-like appearance; they were black, hard, and caused no spots. From these facts, it may well be inferred that this process may well be used in the killing of the silkworm.

Alcan called attention to another operation, namely, the filature or reeling, an apparently simple but important part of the treatment, and one that must be very carefully carried out. To fully appreciate the importance of the improvement to be described, it may suffice to point to the fact that formerly the silk from Persia, China, and the Levant commanded a much higher price than the French production. This condition of things has been changed; for in Europe the silk is now treated differently from the process still followed in Asia. For the better understanding of this operation, let us mention the principal points required in reeling. The most common, as well as the finest, raw silk consists of at least three or four single threads, as many as there are cocoons thrown into hot water which is used for the purpose of softening the threads and to separate them from each other. These single threads have unequal cross sections, and are unequally thick throughout their length; and, moreover, they are not round, but rather flat. Great care is necessary to produce a uniform thread; it should be smooth and brilliant, and when torn should not divide itself; if it does, the union between the single threads has not been perfect. The unification is accomplished by twisting the fibers on their way from the hot water basin to the reeling machine, and it is consequently important that the length of the twisted part should remain unchanged during the reeling of one kind of silk. It is said that to this end Vaucanson has constructed a very simple but ingenious apparatus, which seems to answer all purposes. Unfortunately Alcan has neither furnished an engraving nor a clear description of the invention.

Another point that is very important is that the number and equal strength of the threads should be maintained. As the filature progresses, the diameter of the thread varies; and for this reason, new cocoons must be used from time to time in order to equalize the variation in thickness. The successful performance of this operation requires an apprenticeship of from two to three years.

The third point to be observed relates to the luster of the product. If the threads have not been properly reeled, they exhibit, when magnified, arch-like twists and appear downy. But if they have been stretched in a straight line, they reflect the light, and attain the luster peculiar to properly treated silk.

The improvement made in the art of reeling consists principally in the application of steam power. By this the velocity may be regulated at will, and if the cocoons are well freed from the gummy substance, the operation may readily be carried out. The product obtained is in every respect superior to that obtained by hand; and the process was imperfect as long as hot water, which it is not easy to retain at a uniform and sufficiently high temperature, was used. The stuff called *paquetaille*, a common product, was largely obtained as waste by the direct application of heat.

So long ago as 1810, Gensoul introduced the heating by steam, and from this time dates a new epoch in the manufacture of silk. Two or three years since, a new method for applying heat has come into use in the silk districts of France. The inventor is the manufacturer Limet, of Coisne, department Nièvre, and the principle consists in the alternate or combined action of water and steam, the operation being effected by the alternate opening and closing of stop cocks. The first stop cock furnishes steam with which the cocoons are to be softened; by opening a second cock, they are impregnated with water, which is heated by the steam. If allowed to remain in this position they would sink to the bottom of the basin, which would be a great disadvantage; a third stop cock is therefore opened, by which the water is allowed to reascend, whereupon the cocoons swell, diminish in weight and again ascend to the surface. This operation requires from two to six minutes, according to the hardness, species, or origin of the cocoon. After this preliminary treatment, the reeling is done with great ease, so that the operatives, although generally opposed to innovations, are not likely to return to the old method if they have once used this process. Not only is the silk improved in appearance and the production increased twenty per cent, but defective cocoons may also be reeled without much loss or trouble. Besides, one cocoon or one hundred may be treated with equal certainty.

The invention is characterized by the following considerations: 1. The steam acts uniformly on all cocoons. 2. By the boiling in water mixed with steam, the friction of the cocoons among themselves, which causes loss, is entirely obviated. 3. By the subsequent application of steam, the water is driven out from the cocoons, so that they are caused to float.

The advantages claimed are: 1. The more carefully prepared cocoons can be better reeled, there are fewer ruptures and less loss, and the workmen are enabled to produce one fifth more silk. 2. The silk is smoother, and without down, to which all manufacturers of glossy goods object; it is cleaner from gum and more uniform and strong. 3. The apparatus saves labor, fuel and time.

INTOLERANCE IN SCIENCE.

We have received a pamphlet entitled "On Force of Falling Bodies and Dynamics of Matter, classified with precision to the meaning of dynamical terms, by John W. Nystrom, C. E." It contains 29 pages, of which, to our disappointment, we find 20 filled with different articles published in 1865 and 1872 in the SCIENTIFIC AMERICAN, only 5 pages of explanation of the author's views on the subject, while the remaining 4 are filled, not with scientific refutations, but with personal abuse of his antagonists, who appear to be very numerous, and from among whom he especially singles out Dr. Vander Weyde, saying: "It will do no harm to tell the truth to one of them, every now and then .... equally applicable to all the rest of the high authorities who have invariably attacked me. . . When my ideas differ from what is written in their books, they blindly suppose that I am wrong," etc. He further threatens that he will warn the university where Dr. Vander Weyde graduated of his erroneous philosophy, and "if that university cannot sustain its doctor's statements, he ought to be called back and made to study over again, or be requested to return his doctor's diploma."

We have already in our paper of July 29 and September 9, 1865, given our opinion concerning Mr. Nystrom's views; they agree perfectly with those of the National Academy of Sciences, which met in Washington that same year, and would not accept Mr. Nystrom's papers on that subject, as his method of explanation rather confused than elucidated the matter in question; we are, therefore, not inclined to go into any argument at present, but will only remark that it strikes us as not a little curious that Mr. Nystrom finds so much fault with Dr. Vander Weyde's disagreeing with the books and accepted views, while Mr. Nystrom himself boastfully proclaims that the books and accepted views are erroneous; thus he is guilty of the same offence. Only the manner differs in which both gentlemen disagree from the books, and this appears to be very distasteful to Mr. Nystrom.

We are aware that in theological colleges the diplomas are sometimes withdrawn when the graduates preach heresies, not sanctioned by their orthodox *Mater Alma;* but we wish to remind Mr. Nystrom that science is eminently tolerant, and that a graduate, after having been taught the prevalent scientific doctrines in college (and we are convinced this was the case with Dr. Vander Weyde) is at full liberty to promulgate afterwards new scientific ideas or philosophies, without fear of being prosecuted, called back, or having his diploma annulled. On the contrary, such attempts are considered praiseworthy, as without them science would not progress; we are, therefore, far from blaming Mr. Nystrom for trying to promulgate and defend his views, only he must acknowledge that others have a right to the same privileges, which nobody wishes to deprive him of, even if they cannot agree with his peculiar notions, whether they be on velocity of thunder (see SCIENTIFIC AMERICAN of August 24, 1872) the decimal and tonal systems, or the force of falling bodies, etc.

SCIENTIFIC AND MECHANICAL POSSIBILITIES.

One hundred and fifty years ago, if any one had dared to announce the possibility of crossing the ocean in a vessel driven by steam, or of carriages being driven at the rate of thirty miles an hour by this same agent, or of daguerreotyping the human face on a metallic plate by the light of the sun, and then chemically fixing it there, or of conveying news by electric agency for hundreds of miles, and specially under the ocean, such predictions would have been considered simply ridiculous. And now when science announces that it is possible to control the elements, to cause it to rain or shine at pleasure, and that it is possible to draw from the earth's hidden treasure new resources of untold wealth, imparting the greatest happiness and benefits to the human race, it is still viewed with incredulity by the masses. But a few years since, petroleum was first utilized to our benefit. There doubtless was a time when man never dreamed of warming himself by artificial heat. For ages the savage did not know that the possibility of heat existed in the trees under whose shelter he lay. He pulled up wild roots, picked wild fruits, swallowed the raw oysters and mussels as he wandered naked along the beach. A cave by the river or seaside, or a hollow tree, served him for a shelter. Many generations passed before he learned to make a fire; by slow steps he passed from rude tents, huts and cabins, to comfortable houses and stately mansions, with heating apparatus, by which winter is shorn of its vigor.

Heat increases about one degree to every fifty feet that we penetrate the earth; shafts are now sometimes sunk to a depth of 2,000 feet. It is not within the possibility of mechanism to bore 4,000 feet more; at that depth we should find a heat of at least one hundred and fifty degrees, and in many places even greater than this. Mechanical power could be obtained from the steam and water forced up from this depth. Heated water and steam from these wells could be carried into our houses and warm our dwellings to a summer temperature. Conducted in pipes under the soil protected by glass, we could cheaply grow, in New England, all of the southern and tropical plants and vegetables. The snow could be kept melted from the streets of New York, and all of the buildings warmed from this spontaneous flow, useful also for cooking and other purposes.

The Garden of Plants in Paris is heated by water from an artesian well eighteen hundred feet deep, which has a temperature of 82° Fah., and is carried in pipes under the soil. A salad garden at Erfurt, in Saxony, is heated in the same manner, and is said to have yielded $60,000 a year to the proprietor. J. E. E.

Deep Well.

At the village of Sperenberg, about twenty miles from Berlin, a well has been sunk to the depth of 4,194 feet. A shaft was sunk in this locality, because the known existence of gypsum there led the explorers to infer that they might possibly find a mine of rock salt. At the depth of 280 feet, they dik reach the salt, and continuing on they passed through the salt deposit, 3,907 feet, without having reached the bottom of it. The boring would have been continued to ascertain what deposit lay under the salt, but the mechanical difficulties were too great. The greater part of the boring was done by steam.

THE CONFLAGRATION IN BOSTON.

Another calamity involving the loss of millions of money and valuable property has happened in our midst. Boston, following the sad fate of Chicago, has fallen prey to the flames, and sixty-four acres of her finest buildings lie a heap of ruins. The district burned over is bounded by Summer, Washington, Milk, Congress, Water, Kilby, and half of Central streets, proceeding therefrom in nearly a straight line to Broad street and thence to the Boston, Hartford and Erie Railroad depot. In it are inclnded Otis, Arch, Hawley, Franklin, Devonshire, Matthews, Perkins, High, Purchase and Pearl streets, besides a large number of alleys and places. The fire was discovered on Saturday evening—the 9th inst; and before the engines could arrive, it had spread to the the mansard roof, setting it in a blaze, which, favored by a strong wind, in less than half an hour was communicated to the entire block. So fierce and terrible was the heat that it was impossible for the firemen to remain at their posts; and the granite front walls, of which many of the buildings were composed, cracked and exploded, falling in fragments upon the street. No structure, however massive, opposed the slightest resistance to the flames. Aid was obtained from adjacent cities; and after twenty-four hours labor and the blowing up of several blocks of splendid buildings, the fire was at last brought under control. But in the course of a few hours it broke out afresh, owing to gas explosions, the result of negligence in not shutting off the mains leading into the burned district. Thirty-six hours in all elapsed before the fire was fully reduced. The estimated loss, which will be felt over the entire country, is ninety millions of dollars. Seven hundred buildings, embracing, perhaps, the finest specimens of city architecture in the world, were destroyed.

The fate of Boston enforces more strongly the lessons taught by Chicago, which pointed out the radical defects existing in our modern method of building. The first details of the catastrophe tells us that the flames burst with their greatest fury from the mansard roofs. It is to this imported innovation in architecture that many of our most disastrous conflagrations are due. At the present day in this city, there are scores of these roofs surmounting buildings that are mere fire traps, shells of light, dry beams covered with thin tin or slate, and inviting, by their immense surfaces, immediate ignition from burning buildings in the vicinity. Many of our so-called fireproof edifices are mere skins of iron and masonry, with wooden floors and fixtures, the firing of which twists the iron and tumbles down the whole structure. Our partition walls are too generally made of scantling and lath which receive no protection from their light casing of plaster. If French roofs must be built, the law should require that the walls extend clear up to the decks so as to afford some shield to the light frame work. Wooden church steeples are wisely forbidden in the city, and the same prohibition should be extended to the mansard.

Buildings in crowded localities should be rigidly required to be fireproof, and the use of wood in their construction denied. Interior walls should be of plaster, made in sections and built up, the interstices being filled with dry plaster or other non-conducting and non-inflammable material.

The reports of the late casualty indicate a deficiency of water. With great rivers and bays at the very doors of almost all our large cities, there is no reason why we should not have a most abundant supply. In New York, towers might be built at points along the island which might be kept filled and communicating with pipes laid through all the streets. A powerful head might thus be obtained, and the water be always ready under constant pressure. Or suitable pumping engines of the Holly type might be employed, which, drawing from adjacent rivers, would materially relieve the ordinary fire apparatus.

It should be rendered obligatory to place pipes carrying water through large establishments, so that the entire interior might be drenched by the turning of a single cock. We have heretofore alluded to an excellent system based on this principle, which has been amply tested in cotton mills—the most dangerously inflammable of factories—with every success.

For buildings already erected, such as crowd the narrow thoroughfares of the lower portion of this city, it is imperatively necessary that adequate means of protection from fire be devised and applied, and inventions leading to such are sadly wanted. Wide streets and isolated warehouses have thus far proved to be the only really efficient safeguards, and in further extensions of our cities, this experience will doubtless be turned to profit.

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