

practice, and the high standard of professional education which he disclosed at his inaugural address was fully maintained during the seventeen years of his connection with the University. He was the joint patentee with Sir William Thomson of several valuable improvements in apparatus for submarine telegraphy; being likewise the sole patentee of a number of ingenious engineering inventions, and was much consulted in regard to cases of disputed patents.

Under the encouragement and advice of Sir William Thomson, Prof. Jenkin began to write on scientific subjects so early as 1859, and many of his contributions possess a permanent value. His paper on "The Application of Graphic Methods to the Determination of the Efficiency of Machinery," in 1880, secured the Keith Prize of the Royal Society, and was thoroughly original. He was also the author of an excellent manual on electricity and magnetism, and wrote a history of bridges for the Encyclopædia Britannica. Many of his contributions on miscellaneous topics also attracted marked attention, and showed unmistakably the master's hand.

LIFE-SAVING FIRE APPLIANCES IN NEW YORK.

The officers of the New York Fire Department seem fully to realize the heavy responsibility devolving upon them in a great city, where buildings of ten and twelve stories are not at all uncommon, where apartment houses of even fifteen and sixteen stories are permitted, and where hundreds of people are daily crowded together in one building, and subject, in case of fire, to the same horrible fate. It is true that of late they have been somewhat aided by the loud demand for fireproof buildings, which has forced landlords and contractors to pay some attention to at least the appearance of safety; but in many cases this has been but a pretense in deference to the popular outcry, while if others, with the most honest intentions, the effort has failed. There is, of necessity, so much of combustible material, even in the so-called fireproof structures, that no substitute has yet been found to take the place of civic precautions.

In view of these unavoidable dangers, the department has been giving particular attention to its life-saving corps, and the resulting proficiency in this direction is very creditable. But in this effort, though they have done so much in perfecting the appliances for safety and rescue, their success, after all, depends in a large measure upon the coolness and bravery of the men who have the apparatus in charge. Their victory has been a moral rather than a mechanical one, for the members of the corps have distinguished themselves by their courage in facing appalling dangers, sometimes for the privilege, often for but the bare chance, of saving human life. The desirable spirit of emulation which has been created among them has been materially fostered by the generous public sentiment which is always ready to appreciate and to applaud a brave action. The expression of this appreciation, in the hands of one or two of our public spirited citizens, has taken the practical form of medals of honor, given under such circumstances that any man might covet their possession.

One of these, the Bennett medal for 1884, was recently presented to Foreman John Binns for his bravery in rescuing a lad, under particularly trying circumstances, at the burning of the St. George apartment house. Another, the Stephenson medal for 1885, was awarded at the same time to Foreman David Connor for having the best drilled and disciplined company. The presentation was made at Washington Square by Mayor Grace, and was made the occasion for an entertaining display by the life-saving corps, some of the French officers from the Isere and La Flore being among the spectators.

A five story apartment house, facing on the square, was selected as the theater of action. The corps displayed admirable ease and rapidity of motion in scaling the building, passing from window to window, and descending on the ropes, carrying a "rescued" comrade. Single descents from roof to pavement were made in a quarter of a minute, a very fair speed for vertical open air traveling. In ascending the ladders, some delay was noticeable from the unavoidable slipping of the feet off the rounds. This, perhaps, might have been avoided had the men worn leather stockings or moccasins instead of stiff soled boots. The method of firing a life-line over the building was also successfully shown. Similar experiments at the Palisades, it will be remembered, were illustrated in the SCIENTIFIC AMERICAN for May 23.

Though probably of less value, the part of the display which excited the most decided interest was the practical illustration of the use of the life blanket. The jump from the second story window, made by one of the corps, was comparatively a simple operation, but when made from the third story was a less enviable feat. The force generated by a body of perhaps 160 pounds weight falling through this distance is not inconsiderable, and the stretched canvas, though held by a score or more of stout, strong men, yielded almost to the point of touching the ground. A part of the performance which, presumably, is not ordinarily given,

was the rebound, which sent the jumper up into the air almost to the second story again before his role was completed. The effect was quite amusing, for the figure bounding through the air in a sitting posture had a decided resemblance to "Uncle Jonathan traveling by telegraph," which used to be shown in the children's zoetrope.

This easy dexterity, however, means hard work. The strong muscles and steady head result but from constant practice, and their successful proficiency comes only from daily and persevering effort.

AN ACCELERATING CARTRIDGE.

Among the very recent inventions is that of A. S. Lyman, the veteran inventor, of this city, of what may be termed an accelerating cartridge. It consists of an ordinary cartridge shell firmly packed with powder meal, through the center of which is a longitudinal perforation, as shown in the cut. Powder meal is used in order to compact the explosive into a single piece or block, and prevent the nearly instantaneous ignition which takes place with granulated powder.



When this new cartridge is fired, the ignition begins within the walls of the perforation, slowly at first owing to the small surface exposed to fire producing a low gas pressure, by which the ball is started; but as ignition proceeds the perforation enlarges with increasing ratio, the charge burns with augmented rapidity, and the gas pressure steadily rises, expending nearly its whole effect upon the ball.

The few experiments thus far made with this novel invention have yielded remarkable results, and they indicate a coming revolution in the range and penetration of projectiles. From a small smooth bore gun, 4 feet in length, five-sixteenths inch bore, with a powder charge of nine-tenths of an ounce, made in the new form, a projectile 9 inches long, weighing 3½ ounces, has been driven into a target composed of 9 plates of boiler iron, each one-fourth inch thick.

Eight of the plates were pierced, the forward end of the projectile then curved upward, boring up within the body of the ninth plate, and making an aggregate penetration of iron by the projectile of over four inches. It is estimated by the patentee that with a three inch gun and 40 pounds of powder a projectile may be sent through a solid iron armor plate three feet thick. Should these expectations be realized by actual experiment, it would seem as if, in the naval battles of the future, the elements of light vessels, great speed, and rapid firing qualities would become prominent.

As to land defenses and military operations in general, radical changes would necessarily follow from the introduction of small arms and artillery having the extraordinary ranges and power which this new invention promises.

Car Builders Discussing Car Couplers.

At the recent annual convention of the Master Car Builders' Association, held at Old Point Comfort, Va., the question of automatic freight car couplers came up for the usual amount of discussion. There were ninety-four members present, representing railroads running nearly half a million cars, besides several railroad commissioners from the different States, who were seeking information to guide them in recommending legislation on the subject. Notwithstanding the Massachusetts law, and the tests made in Boston last fall, to promote the adoption of a uniform automatic freight car coupler, the inherent difficulties of the subject are such that but slow progress is being made toward the end sought, and any legislation by other States in the same direction seems to be of at least doubtful expediency until there can be some uniformity of opinion as to what action should be taken. The provisions of the law of New York State are different in that they apply only to new cars, as follows:

"After July 1, 1886, no couplers shall be placed upon any new freight car to be built or purchased for use, in whole or in part, upon any steam railroad in this State, unless the same can be coupled or uncoupled automatically, without the necessity of having a person guide the link, lift the pin by hand, or go between the ends of the cars."

It was urged at the convention that, to enforce the adoption of automatic couplers by legislative enactment, before some uniformity of action could be practically determined upon, would create such confusion that the danger to trainmen would be increased instead of diminished. Representatives of the Fitchburg, the Chicago and Alton, and the Lake Shore spoke favorably, though tentatively, in favor of automatic couplers they had been introducing, though the latter company had "not been going very fast," but were nevertheless "anxious to end the hazardous business of coupling with link and pin." The whole subject was finally referred to the Executive Committee, "with power to arrange for and conduct a public trial at some central point, to employ one or more experts, and to request the co-operation of the railroad companies in making trials and in furnishing the funds for

conducting the same, the Executive Committee to make report of the results and to make recommendations at the next meeting of the Association."

Although the difficulties are so great in the way of selecting the best automatic coupler, it is to be noted that the most of the leading lines are gradually adopting one or another style of such coupler; there can be little doubt, however, that the movement would be general and the progress of the change rapid if all were agreed as to what was the most desirable coupler to adopt. In SCIENTIFIC AMERICAN SUPPLEMENT, No. 459, will be found illustrations and description of eight styles of automatic couplers, from among those which have thus far seemed to meet with most favor.

Typhoid Fever at Plymouth.

The following interesting account of the outbreak, progress, and cause of the dreadful fever scourge, which has abated only at intervals since last March, in a small mining town in Pennsylvania, we find in the July issue of the *Herald of Health*, published in this city. It is from the able pen of the editor, Dr. M. L. Holbrook, and teaches a lesson which should be a warning to people in many localities:

The town of Plymouth is situated favorably for health, being on a dry hillside, well exposed to wind and sun, on the banks of the famous Susquehanna River. But good air and sunshine are not always sufficient to secure good health. Like most towns of its size, it has no system of sewerage, and many of the vaults or closets are very imperfectly constructed. Every year, when the winter breaks up and the snow melts, a large amount of decaying matter which has been thrown out during the winter by the housekeepers is deposited on the ground, and pollutes both water, soil, and air. Most of the wells are shallow, owing to the peculiar geological formation of the region. These wells are generally abandoned, the houses being supplied with water by the water supply company of the place. This water is gathered into reservoirs from mountain springs and from an artesian well. It is ordinarily excellent, but liable to be polluted during freshets by surface water, which carries whatever filth it gathers from the soil in its course to the streams.

Plymouth has long suffered with typhoid fever, more or less; but between April 10, this year, and June 1 there have been over 1,000 cases. The origin of the outbreak has been investigated as carefully as could be, and, no doubt, correctly. None of these families suffered from the disease who used well water or river water, though neither were of the best quality; it was only those who used the reservoir water that contracted it. It was found that the reservoirs of mountain spring water had been polluted. It happened as follows: Between two of the reservoirs there was a farm with a house, 60 feet from a deep, narrow gully, through which a mountain stream passed to the reservoir. A farm hand employed here was taken with typhoid fever early in January, and owing to imprudence had a serious relapse, so that he was ill most of the winter. So long as the ground was frozen no harm occurred; but in March there was a thaw, and the drainage from the vault where the excrement from this sick man was thrown was washed into the stream in the gully, and soon made its way into the reservoir below. The epidemic began 13 days after the water in this reservoir was used.

The lesson we learn from this case is, that pure water is of the greatest importance; that even pure water may become fouled without its being known to the consumer, and that those persons who have charge of patients ill with such a dangerous disease as typhoid fever may cause a great many deaths by being careless as to the disposal of the excrement. It also teaches us another lesson concerning water supply companies, and the little care they seem to give the matter of constantly watching the sources from which their water is obtained, and doing all in their power not only to prevent contamination, but to purify water which has been fouled. It suggests, too, an entire change in the method of disposing of human excrement, and the desirability of having it composted and turned into a fertilizer rather than allowing it to accumulate for months and years and breed corruption. Most of all, it proves the necessity of enlightenment on the matter of household sanitation, the danger of ignorance on these subjects, and the thoughtlessness of the majority of human beings.

The question may be asked, How was it possible for so small an amount of poison to contaminate so large a quantity of water? This is easily explained if we accept the germ theory of disease. Each germ is a seed which, under favorable conditions, multiplies rapidly. A few germs in a congenial soil become millions in a few days. In this case, the water from the melted snow carried with the germs much soluble matter into the reservoir, and this served as a food on which the germs fed and multiplied, just as weeds do in a rich garden soil.

Young ostriches are warmed out of their shells by incubators in California, and manifest great astonishment when they discover they are not in an African desert. They have not yet become accustomed to being born on this continent.