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## AN AMERICAN BULLET PROOF SHIELD.

Mr. W. J. F. Lennard, a stairbuilder, of Brooklyn, N. Y., has invented a bullet proof shield claimed to be superior to that of Herr Dowe, the Mannheim tailor, described in the last issue of the SCIENTIFIC AMERICAN. It is said to be composed of cotton, felt, wood, and a chemical compound of parts mineral and vegetable. A public test of the bullet proof qualities of the new shield was made at one of the Brooklyn parks on July 12. It was in the form of a pad seventeen inches long, thirteen inches wide, and a trifle less than two inches thick, being somewhat flexible, and weighing eleven pounds. This pad was hung on the neck of a wooden figure, and shot at by a marksman with a 45 caliber army rifle, the cartridges being loaded with seventy grains of powder and 405 grains of lead. The bullets partially penetrated and embedded themselves in the pad, but did not go through it. The inventor afterward put on a similar pad, and was shot at by the marksman, the same gun and cartridges being used, when the shield proved an effective protection against the bullet. The inventor said there was no feeling from the impact of the bullet, except a slight sensation as if some one had poked him with a finger. The inventor does not claim that this shield would be effective against steel bullets, but only against lead bullets. His shield is the result of experiments for a composition to use in armoring ships, which he claims will be lighter and better than steel plates.

## FAILURE OF A LARGE ARMOR PLATE.

An armor test of a Carnegie nickel-steel Harveyized plate, seventeen inches thick, took place at the Indian Head proving grounds on the Potomac near Washington, July 12, and like the eighteen inch Bethlehem plate tested May 19, ended in the failure of the plate. The same gun—the 12 inch rifle—was used in both cases. The plate was secured to a 44 inch oak backing, heavily braced. The distance of the gun from the target represented a range of about 1,200 yards. The Carpenter projectile weighed 800 pounds and was propelled by 260 pounds of brown prismatic powder; the muzzle velocity was 1,410 feet per second. The first projectile fired penetrated 13½ inches and then bounded back 50 feet. In the second Wheeler-Sterling shot the velocity was increased to 1,858 feet per second and the striking energy was advanced to 20,370 foot tons. The havoc wrought was terrible; the shot crashed through the plate and backing, deflected up, and landed 300 feet away. The head of the shot was somewhat injured, but the body of it was intact. The result was a great surprise to all concerned, especially to the makers, who had used all possible care in its fabrication, the plate being left in the Harvey furnace for twenty-eight days. Upon this test depended the acceptance of 287 tons of armor for the battleship Oregon, worth \$246,000. The loss to the company for the plate, even if the armor is finally accepted, will be \$20,000.

The Secretary of the Navy ordered another test the next day, using the same shells as were used in the June test of a Bethlehem plate. The Carpenter projectile penetrated the plate and stuck fast in it; the plate was cracked. The Navy Department will conduct exhaustive tests on Harveyizing armor before accepting more plates.

## EDUCATION IN AMERICA.

We publish in the SCIENTIFIC AMERICAN SUPPLEMENT of this week a very remarkable paper on the schools of America, by Duane Doty, Superintendent of Public Instruction of Chicago. It is a summary of the last report, just issued, of the United States Bureau of Education. From the earliest days of the republic, the necessity of education for the people has been a generally accepted doctrine, and the impost of taxes for the purpose has been generally acquiesced in willingly. It is hard to see how any substitute for the public schools could be invented. It would seem more logical for each individual to pay for the education of his own family. But private schools would never be so widely distributed as are the public schools. In the rural districts, far from any village of account, will be found the public school, to which children resort from miles away in all directions. Private enterprise would never do the work done by the rural public schools.

The statistics and data contained in the article referred to are of deep interest. They go to show what an immense machinery is used in public school education, and reveal an industry of the largest dimensions devoted entirely to intellectual culture and advancement. The same statistics show the rapid growth of the system. Every year sees it more developed and more difficult of replacement. The great area of our country is one of the causes which will tend to make it permanent.

The paper referred to, however, is devoted to education in general, not merely to the public school system. It shows that as the higher departments are reached, the percentage of scholars attending private schools increases. But the facts that in the elementary grade of public school ninety per cent of the school population are educated and that in all schools and colleges

together the public schools and colleges educate eighty-nine per cent are impressive. The agency which controls the education of so large a proportion of the population of the country is one which should receive the greatest consideration and care from those administering it, for education can be a power for evil as well as for good.

## BROOKLYN MEETING OF THE A. A. A. S.

The scientific and educational institutions of Brooklyn have united in inviting the American Association for the Advancement of Science, with its affiliated societies, to hold its forty-third annual meeting in that city. The hotel headquarters of the officers and others will be at the St. George Hotel. The official time as announced will be from August 15 to August 24, although some of the special societies may meet earlier or later than those dates. The opening sessions will be held daily in the Polytechnic Institute, the evening addresses and receptions will be in the Academy of Music and Art Building, and the sections will meet in the rooms of the Packer Institute. Every facility for lantern illustration will be in constant readiness for the day meetings, as well as when required in the evening. Many eminent foreign scientists have accepted invitations to be present, which will add much to the interest of the occasion.

Excursions have been planned for combining science with social pleasure to various mines, quarries, mountains, cliffs, and marl beds; to Long Branch for the study of marine algae; to Cold Spring to inspect the State fish hatchery; to West Point to inspect the Palisades and Highlands and Military Academy; various local trips to points of interest about the harbor, navy yard, etc., and finally, at the close of the sessions, an excursion to the Forestry Congress at the White Mountains. These plans are liable to be modified, and additional ones may be arranged for, of which notice will be given in due time. As far as possible these excursions are to be free, or at greatly reduced rates. The regular railroad rates to and from the meeting will be reduced, and special terms are to be had for hotel accommodations. Concessions will also be made by the express, telegraph, and telephone companies. In a word, everything will be done to make the Brooklyn meeting delightful and successful.

Full information can be had on application to the local secretary, Prof. G. W. Plympton, or to Mr. E. T. Johnson, relating to hotels and lodgings. It will be sufficient to address simply in care of A. A. A. S., Brooklyn, N. Y. Communications as to scientific papers, membership, etc., should be made to Prof. F. W. Putnam, permanent secretary, Salem, Mass.

## THE GREAT RAILROAD STRIKE.

It is an accepted doctrine in political economy that the loss of one person's property is the loss of all. When a building burns in a large city, in some form or other the entire community has to bear the loss. Property is never destroyed without all suffering in some way. In the science of government a very general opinion is expressed in the saying that the best governed people is the least governed. Like some other sayings this cuts both ways; there is no doubt that a community of individuals, so orderly and well-behaved as to require but little government, would live very happily, and from their very nature would, in being self-governed, be little governed and well governed. But unfortunately the law has to deal with all classes of men. America especially has been receiving the outpourings of Europe for many years, and there is a strong feeling that the class of immigrants of the last ten or twenty years does not compare favorably with those of the preceding epoch.

The law throughout is based on the doctrine of expediency. A country governed by strictly logical laws would be far from practicable, at least under present conditions. The object of government being the preservation of order and peace and the prevention of crime, the law should secure these ends by the simplest and most efficacious means possible. Thus in a large city, if a given procession of innocently disposed people would be the occasion of a riot, no complaint could be made if the police took the practical though illogical step of prohibiting the parade and preventing the riot.

The great strike which has occupied so much of the attention of the country during the last few weeks is apparently on the point of collapse and illustrates the above points. The Federal troops have gone into action and seem to have done good work at the expense of very few lives. A vast amount of property has been destroyed, striking workmen have lost an immense sum in wages, and Cook County, Illinois, together with other railroad centers where rioting has taken place, will probably be burdened with a very heavy tax bill for the payment of damages to property incidental to the rioting. Incalculable harm has been done and the entire United States will have to foot the bill. It is easy enough to criticize the use of the Federal troops in the matter, it is natural for local militia to object to fight their own neighbors and friends, it is well for the upholders of the strong arm of the law to exult in the