

ENGINEERING.

What is claimed to be the record torpedo shot of our navy was made during the recent maneuvers of the Atlantic fleet off Provincetown, when the submarine "Cuttlefish," selecting the battleship "Vermont" for attack, fired a torpedo at a range of 3,800 yards, hitting the "Vermont" squarely amidship.

A gas-driven street car is now under construction in Philadelphia, which is to be tested on the line of the Metropolitan Street Railway Company of New York in competition with the electric cars of the company. It will be driven by two 4-cylinder motors, each of 24 horse-power. These will be water-cooled, and piping will be led from the motor jackets around the interior of the car to heat the latter during winter service.

The fast steam yacht "Winchester," which is now being built by Yarrow, will attract considerable attention because of the up-to-date character of her motive power. Steam will be supplied by water-tube boilers fired exclusively with oil fuel, and the yacht will be driven by Parsons turbines of 2,400 horse-power operating three single-propeller shafts. The vessel, which is of 180 tons, is 165 feet long, 15 feet 6 inches beam, and 9 feet 9 inches deep.

The French battleship "Iena," which a few years ago was wrecked by an explosion of the smokeless powder in her magazines, is being used as a target, and several important problems are to be determined relating to the effect of shell fire. Recently, after caged animals had been placed on board the ship, she was attacked by the cruiser "Latouche Trouville" with high-explosive shells. The deadly effect of the gases of the explosion was shown by the asphyxiation of several of the animals.

There is no doubt that one cause of the objection to motor cars on the part of a certain section of the public is the use of headlights of dazzling brilliancy. The Technical Committee of the Royal Automobile Club are making experiments with a view to finding a lantern which will give sufficient light for vision, but will at the same time be so controlled as not to dazzle the drivers of approaching vehicles or pedestrians. The tests are being made with acetylene, petroleum, and electric lamps.

Last week we made note of the retirement of two famous record holders, the "Umbria" and "Etruria," from the Atlantic service. It is now announced that the "Lucania," which was recently burned at her pier in Liverpool, will not be repaired, but will go into the hands of the underwriters. She was the first vessel to make the transatlantic trip at over 22 knots an hour. Her place will be taken by a new turbine 21-knot ship of 25,000 tons.

The work of installing the roadbed, rails, and operating equipment of the recently completed D tube of the Pennsylvania tunnels below the East River, was begun in Long Island City last week. Of the four tubes, the two inner tubes, known as B and C, are nearing completion; and all four can be finished and in readiness for operation between Long Island City and the Pennsylvania Terminal on Manhattan Island by the first of next year.

The Cleveland Industrial Exposition, which we recently had the pleasure of visiting, has been successful beyond the expectation of the Chamber of Commerce, which is responsible for its promotion. The exhibits were more numerous and of a higher character than was anticipated, and the attendance has run up to as high as 30,000 daily. It looks as though the huge national exposition, which as in the case of the St. Louis Fair had grown to an altogether unwieldy size, will in the future be replaced by local expositions held in the larger cities.

Everyone who is familiar with the valuable historical collection of scientific appliances now at South Kensington, London, will regret to learn that "at present these treasures are huddled together in makeshift buildings quite unsuitable for the purpose of a museum." The commissioners of the great exhibition of 1851 offered \$500,000 and a suitable site for a properly equipped science museum, provided the government would undertake to maintain it. A delegation representing all the scientific interests in Great Britain have urged the government to give their immediate attention to the proper housing of this collection.

The grand total of excavation on the Panama Canal during the month of July was 2,843,260 cubic yards, which is 52,533 cubic yards less than the total for June, and 1,037,077 less than the highest record, made during the dry season in March of the present year. Of the amount removed from the canal prism, 1,684,663 yards were taken out by steam shovels, and 1,107,814 yards by dredges. The mean rainfall was 10.66 inches for the month, in which there were twenty-six working days. Incidentally it may be mentioned that the Tariff Act, approved by the President August 5th, authorizes a bond issue of \$290,569,000, in addition to the \$84,631,900 heretofore issued for canal construction.

ELECTRICITY.

During the recent rioting at Barcelona, all the gas and electric-light plants were out of commission, and the city was illuminated only by the searchlights of warships in the harbor.

At the annual convention of the Association of Edison Illuminating Companies, the licensees under Mr. Edison's patents, held last week at Scarborough on the Hudson, was celebrated the thirtieth birthday of the incandescent lamp.

In order to compete more effectively with the gas company, which lets kitchen and other stoves, the municipal electric light plant of Aberdeen, Scotland, has laid in a stock of electric heating and cooking apparatus, which it proposes to offer for hire at proportionately low rates.

An electrical exhibition will be held in Boston from the 15th to the 25th of November, at which all the latest labor-saving and comfort-giving devices will be exhibited, with elaborate and novel decorating and lighting effects. Prizes will be awarded for the inventions and ideas of amateurs, and space set aside for the exhibits of amateur wireless operators.

Our allusion last week to a power shovel as an unlikely machine to be successfully electrically driven, has caused our attention to be drawn to an electric well-drilling machine produced by the Keystone Driller Company of Beaver Falls, Pa., and successfully operated near Chicago. From the very wide range of its operations, often remote from habitation, let alone power plants, the driller certainly seems an even less likely machine to be operated electrically than the shovel; but the supply has doubtless been created by a demand, and in districts where prospecting or other drilling is carried on within reach of electric wires, the machine should have great advantages.

The Montreal Light, Heat, and Power Company has announced that it will engage in the ice business, obtaining water from artesian wells and freezing it by electric power into blocks of any desired shape and size, so as to avoid cutting. This is an example which might with advantage be followed by many a smaller plant. Every lighting plant must be capable of carrying a certain maximum load at the time of night when most lights are in use, but for at least 18 hours out of the 24 the load is from half as much in large cities to almost nothing in small country places, where there is little industrial use of electrical power, so that during the greater part of the day much of the capital invested is earning no dividends. The surplus power might just as well be used in making ice and providing another source of revenue, particularly as the time when the "peak" load is of shortest duration coincides naturally with that of the largest consumption of ice.

Remarkable results have been obtained by an electrical ozone-generating apparatus recently installed at the public library on Michigan Avenue and Washington Street, Chicago. It appears that complaints had constantly been made of the unpleasant odor from accumulated human emanations, and this in spite of an excellent purified-air ventilation system, the nuisance becoming such that an attempt had to be made to counteract it. Direct current at 110 volts is converted to alternating at 120 by a rotary converter, and the latter stepped up to 8,000 volts by a transformer. This high-tension secondary current discharges between the plates of the ozonizer, through which is drawn the air led to the ventilating apparatus above. Enough oxygen is converted to free ozone to kill any living organisms in the air and neutralize any kind of odor. The most remarkable result of the installation appears to be the substitution for unpleasant if not actively unwholesome air of an atmosphere actively healthful.

The Electrical Review suggests that "trackless trolleys," such as are successfully used in Austria and elsewhere in Europe, that is to say, electric vehicles running on ordinary roads, but taking power from overhead wires, might be advantageously used to take the place of horse-drawn stage coaches, which still connect with the railroads numerous villages having no other means of transportation, even in the most populous parts of the country. It is pointed out that such stage lines rarely have a traffic which would encourage the projection of electric railroads to take their place as a profitable venture; but figures are quoted to show that of the cost of roadbed, track, and electric-line construction in electric railroads, only 15 per cent or less is for overhead conductors and poles; considering therefore that electric road vehicles are obtainable for a much lower cost than railway cars, and that the power-generating plant would be so much less for a little line operating only three or four stages back and forth per day, it is obvious that such a trackless trolley system could be undertaken for a tenth of the cost of an electric railway, and with a much better chance of profitable operation.

SCIENCE.

Plans have been filed for a new home for the American Geographical Society at 156th Street and Broadway. The building will form one of a group that now includes the Hispaño Society's home and the Numismatic Museum, although it has no connection with either institution. The building will be erected from funds provided by Mrs. C. P. Huntington. The estimated cost of the building will be between \$250,000 and \$300,000.

Prof. Charles Richet of Paris has devised a means for purifying the air in rooms. According to press dispatches, his apparatus is an air filter which mechanically sterilizes air. Very fine drops of glycerine are scattered along the walls of a cylinder containing a suction fan. Each particle of air drawn in by the fan is freighted with glycerine, and hence tends to drop, thereby carrying with it the germs, dust, and microbes with which it may be laden.

The peculiar odor of clay is unquestionably due to organic ingredients. Although these cannot be isolated or detected by chemical analysis, they can be classified according to their physiological effects, which vary widely. Rohland has succeeded in transferring the odors of clay to saccharate of iron and has thus recognized ten distinct varieties. Louis has made similar observations, employing ammonia as a vehicle for the odors.

Charles S. Philipp has produced a variety of glass which is a good conductor of electricity by fusing together 32 parts of sodium silicate, 5 parts of borax, 0.8 part of lead oxide, and 0.2 part of sodium antimoniite. The glass is not attacked by acids. Its electrical resistance is about 1,000 times smaller than that of ordinary glass. It is used chiefly for the disks of electrometers and electroscopes. Filaments of the new glass may even be substituted for the gold leaves of an electroscope.

A human hair of average thickness can support a load of 6¼ ounces, and the average number of hairs on the head is about 30,000. A woman's long hair has a total tensile strength of more than five tons, and this strength can be increased one-third by twisting the hair. The ancients made practical use of the strength of human hair. The cords of the Roman catapults were made of the hair of slaves, and it is recorded that the free women of Carthage offered their luxuriant tresses for the same use when their city was besieged by the Romans.

In the early part of the present year the French Academy of Sciences discussed a communication in which it was asserted that the human body emits radiations which affect photographic plates. In the course of the discussion De Fontenay demonstrated that the effects which had been attributed to radiations could be explained perfectly by the warmth and moisture of the body. Later, an attempt was made to sustain the theory of human radiations by the statement that the Lumière company had been compelled to discharge several employees who fogged the plates that passed through their hands. De Fontenay investigated the matter and found that nothing of the kind had ever occurred at the Lumière factory. Every case of fog was due to accident and to well-known causes—finger marks, packing strips, lantern fog, etc.—not to any mysterious human radiation. In regard to animal magnetism, unknown natural forces, and other occult agencies, it is bad enough to be assailed with crude experiments and unproved assumptions, without the aid of false testimony. Legends of this sort are easily propagated and hard to kill. Ten years hence the alleged experience of the Lyons plate makers will doubtless be still adduced as a proof of human radioactivity.

A. Kuerth has obtained the following results in a series of experiments on the effect of heating on the hardness of various metals: A bar of very uniform copper was cut into five pieces, 2½ inches long and 8/10 inch broad. In the cold all pieces showed exactly the same hardness. They were heated in oil or saltpeter baths to temperatures of 300, 570, 660, 700, and 840 deg. F. respectively for from one to thirty minutes, and allowed to cool, the hardness in each case being determined at the temperature of about 70 deg. F. The specimen heated to 300 deg. F. showed a hardness which was almost independent of the duration of heating, the coefficient of resistance being eighty kilogrammes per square millimeter, but in other cases very great variations were observed. With the bar heated to 840 deg. F. the value of the coefficient fell in one minute to 40, and thereafter remained almost constant at 37. Other experiments were made with specimens of nearly pure nickel, aluminium, zinc, and tin, and with various Krupp steels. The temperatures used ranged from —116 deg. F. to 900 deg. F. In general, the hardness of steel decreased as the temperature rose, up to about 390 deg. F., at which point there was a slight increase in hardness, which was followed by a diminution as the temperature was raised still higher.