

ENGINEERING.

We are not surprised to learn that the engineers of the special commission appointed to examine the new Blackwell's Island Bridge, over the East River, are reported to have found that the structure is not equal to carrying the full number of proposed tracks and roadways. It will probably be suggested that two of these tracks be omitted.

It is gratifying to learn that the rapid rate of construction of the Panama Canal continues. The grand total of excavation during the month of September was 3,158,886 cubic yards, all of which, except 69,035 cubic yards, was excavated from the canal prism. Of the grand total, 1,374,856 cubic yards was taken out by dredgers, and the remainder was dry excavation.

The good and bad qualities of a street paving block made of iron slag may be summarized as follows: It has a hard and durable surface, does not absorb moisture, and may be readily cleaned. The abrasion being but small, it makes very little dust or mud. When it is properly laid it presents a true surface, and consequently the traction is easy compared with that of some other types of paving. On the other hand, experience has shown that it wears to a slippery surface, making it hard on horses, and there is a tendency to flake off at the surface, in which case hollows are worn, and the street presents an unsightly appearance.

Among the facts of interest brought out at the International Road Congress in Paris is the extremely small per cent of public roads in the United States that have been improved and rebuilt on modern lines. Out of a total of 2,151,570 miles of public road only 7.14 per cent, or 153,662 miles, have thus been improved. Most of the papers were agreed that the ideal road of the future should have a hard, unyielding foundation, with a surface of suitable broken-stone ballast, treated with some preparation to prevent the stripping of the top dressing. There is a consensus of opinion that treatment with tar has proved the most efficacious in shedding water and in keeping down the dust.

Railway travelers will have noticed the curious and apparently complicated valve mechanism which is being adopted quite generally on recent locomotives in this country. It is what is known as the Walschaert gear, which has been used for several decades in Europe, but has only recently made its appearance in this country. Its adoption is due to the increasing size of our locomotives and the difficulties experienced with the Stephenson link motion from the heating of the eccentrics. In the Walschaert gear the place of the eccentrics is taken by a return crank on the outside of the crankshaft. The gear being placed exterior to the frames renders it readily accessible for inspection and oiling.

It will be remembered that some eighteen months ago two Holland sleeping cars were put in service experimentally on the Illinois traction system; and we note with satisfaction that they have been so well patronized as to prove a paying investment. It has developed, however, that in future, because of the noise and vibration which they occasion, both motor cars and air pumps should not form the equipment of a sleeping car. Consequently, the two additional sleeping cars which the company has ordered will be trailers. The company believes that ultimately a profitable, low-fare sleeping car service will be established over the entire system and that it will prove to be profitable.

Because of their well-known fuel values, the immense deposits of peat have been the subject of considerable experimental work. Much money has recently been spent on the moors of Dartmoor and the Goss and Tregoss moors in England, in the attempt to convert peat into a marketable commodity on a large scale; a new Swedish invention is about to be tried in which the peat is first worked into a homogeneous pulp, and then heated, under pressure, to over 150 degrees Centigrade; after which the water is pressed out and the residue formed into briquettes. It is claimed that six pounds of the briquette will give as much heat as four or five pounds of good coal, and that the product will be considerably cheaper than coal.

A generating unit of novel design is being built for the Interborough Transit Company by the General Electric Company. One of the present 5,000 kilowatt reciprocating compound engines will be arranged to deliver its exhaust to a 5,000 kilowatt low-pressure turbine of the Curtis type. The turbine will be directly coupled to an induction generator, which will be connected to the leads of the reciprocating engine governor. There will be no governor on the low-pressure turbine, which will be controlled in speed by the generator, the latter being controlled by the governors on the reciprocating engines. It is expected that a far larger output will be obtained from this triple-expansion combination, as compared with that obtained from the reciprocating engine alone.

ELECTRICITY.

It is reported that the Erie Railroad will soon begin the electrification of its main line between Jersey City and Suffern. The plans are being drawn up and it is expected that electric trains will be run over this 32-mile section within a year.

A company has been formed to bore another tunnel connecting Switzerland and Italy. This tunnel will run through Mt. Blanc, starting at Martingly, in Switzerland, and coming out at Courmayeur, Italy. It will be 28 miles long and it is expected that it will be completed in three years.

One hundred thousand gallons of water sterilized by electrically-generated ozone are used daily by the Pittsburg Homeopathic Hospital. Dry air is passed through the ozonizers and the ozone produced is mixed with the water by means of aspirators. Three ozonizers are used for sterilizing water, while two provide ozone used for sterilizing instruments and bandages.

At the recent meeting of the American Street and Interurban Engineering Association of Atlantic City, a new system of street railway construction was proposed. The idea was to form the car wheels without flanges, but instead to place the flanges on the rails. The new construction was ably presented and many good arguments were brought forward to show the superiority of such a system over the present one.

A new process for making an insulator, according to the Electrical Review, has appeared on the Continent. It resembles ebonite and consists of a mixture of tan bark with one-third of sulphur. The whole is heated until the sulphur melts. The mixture is well stirred and then cooled, when it takes the form of small black grains. These are put in a pressure mold and heated, the result being a block of insulating material of any form.

According to the Electrical Journal there are twenty-eight single-phase roads in America, with 691.8 miles in operation, and 274.5 miles under construction. Abroad there are thirty-six single-phase railroads covering 771.05 miles with 57.75 miles under construction. The total number of single-phase locomotives in this country is fifty-seven and the number of cars 240, as against forty-three locomotives and 222 cars abroad. The total horse-power here is 137,400, while the total of foreign roads is 64,160.

Recent experiments have been carried out in the German Reichsanstalt to show the effect of rolling on the magnetic properties of steel. The steel was found to be magnetically more efficient at right angles to the direction of rolling than parallel to the direction of rolling. The difference was quite marked. The investigations also showed that samples of sheet steel which had been annealed underwent great changes in a period of six months. The steel appeared to have deteriorated as far as its magnetic capacity was concerned.

The value of electricity for heating purposes is illustrated in a new electric glue pot which has recently been placed on the market. The economy of the device lies in the fact that the maximum amount of heat may be applied instantly when needed, while the glue may be kept warm at all times by a reduced flow of current through the heating coils. The glue pot consists of a cup in which the glue is placed, and which is set in a casing filled with water. The electric heater is attached to the pot immediately below the water. A hot-water receptacle is provided in which the brushes may be kept.

Electric generators were first adapted to be coupled to reciprocating engines, and hence were designed for comparatively slow speed. When it came to coupling the generator to a turbine it was necessary to operate it at a lower speed than was economical, so as to accommodate it to the slow-speed electro-generator. Recently generators adapted for high-speed service have been designed and a special type of turbine, known as the double-flow turbine, is used to operate these generators. There are several 10,000-kilowatt two-pole machines now under construction adapted to operate at 1,500 revolutions per minute.

The quartz lamp represents the latest development in mercury vapor illumination. It has been found that the mercury arc increases in efficiency up to a certain degree with the rise of temperature when incased in a glass tube. When a quartz tube is used instead of glass the temperature may be raised still higher because the quartz resists a higher degree of heat than does the glass. The new lamp consists of a tube from 2½ to 5 inches long and from 0.4 to 0.6 inch in diameter. The arc is started by tilting the tube so that the mercury will connect the two electrodes. The tilting is accomplished automatically by an electromagnet. Instead of the bluish light given in the glass tubes the quartz lamp yields a yellowish green light of much greater intensity, and a glass globe must be used over the quartz tube to protect the eyes from ultra-violet light. At the start the lamp absorbs 25 to 30 volts, but as the pressure increases the voltage rises to about 180.

AERONAUTICS.

Now that the Aeronautic Society has secured such a splendid place for aeroplane races as the Morris Park race track, the Aero Club of America (which is the chief aero-sporting organization of this country) should raise a large cash prize for an international aeroplane race, which could be held next spring, or some months before the race in France. This would keep America in the lead from both a practical and sporting point of view, and would be of the greatest benefit to the new science.

A considerable number of new cash prizes for aviation performances have been offered of late, the largest and most recent of which is one of \$20,000 given by the Aero Club of France for a big aeroplane race to be held next fall in France. At Nice a cash prize of \$2,000 will be put up for a similar race in the summer. In addition to the \$50,000 cash prize for an aeroplane flight of 180 miles from London to Manchester, the London Daily Mail offers \$2,500 for the first flight across the English Channel.

After making an excellent flight of nearly 3 miles in 4 minutes on the 3d instant with his monoplane, in the course of which he demonstrated his ability to make sharp turns, M. Bleriot once more suffered a fall from a height of some 60 feet on the 22d of October, when he was competing for a prize for height of flight. Too much gasoline fed to the motor caused it to lose speed and finally stop, after which the monoplane glided to earth. M. Bleriot managed to incline it so that the tail struck first and cushioned the shock. The machine was badly damaged, but the aviator was unhurt.

The Aero Club of America will conduct a contest for the SCIENTIFIC AMERICAN Trophy in connection with motorcycle races and the aeronautic exhibition and tournament of the Aeronautic Society at Morris Park during the afternoon of November 3, provided the weather permits, and also provided one or more machines capable of flying are entered. The Michelin prize of \$4,000 for the longest flight in the year can also be competed for by any machine at this time. It is expected that aviator Curtiss will be present with the new tailless aeroplane of the Aerial Experiment Association, and that he will attempt to win both the SCIENTIFIC AMERICAN Trophy and the cash prize.

Less than three months ago Count Zeppelin's fourth airship was destroyed, yet so quickly and generously did the entire German nation come to his aid—\$750,000 was raised—that he has already built the "Zeppelin V.," which made its initial flight above Friedrichshaven on the 23d instant. The press reports indicate that a successful flight was accomplished. The new airship carried 10 passengers and maneuvered for 3½ hours. It rose to a height of 600 feet and attained a speed of 29½ miles an hour. On the same day the "Parseval" military dirigible of Germany is reported to have dropped suddenly some 6,000 feet, owing to the bursting of the rearmost compartment of the envelope. A safe landing was made, and no one was injured. Our own government dirigible is being patched up at Fort Myer, the plan being to make some more practice flights with it before packing it away for the winter.

The net result of the three great balloon races held abroad on the 4th, 11th, and 12th instant has been the loss of two lives and the breaking of but a single record—that for length of time in the air. The Grand Prix race of the Aero Club of France, in which there were eighteen contestants, was won by the "Centaure," piloted by Georges Blanchet, which covered a distance of but 341½ miles. In the international race for the Bennett trophy (which, together with the endurance race the next day, was held at Berlin), there were 23 competitors. Four of these came down in the North Sea, and two balloons burst. The British "Banshee" was declared the winner, with a distance of but 270 miles. The Swiss balloon "Helvetia," piloted by Col. Schaeck, broke the endurance record by 20 hours, remaining aloft 74 hours, and only landing when it was towed six miles to the island of Kristiansö, near Norway, against the will of its pilot. This island is only 210 miles in an air line from Berlin, but the balloon altogether traveled nearly 800 miles, as it made a trip to Russia and back first. The Belgian "Belgica" covered 262 miles, and the French "Condor" 248. The American "St. Louis" came down in the North Sea some 238 miles from Berlin, and the French "Ile de France" and "Brise d'Automne" at a point 226 miles distant. Besides four balloons in this race, two of those in the endurance contest came down in the North Sea. The two men in each balloon were rescued in every case save in that of the German "Plauen," which was found drifting about occupantless, Lieut. Foertsch and his companion evidently having been drowned. Most of the balloons traveled around Berlin in circles for a day or more, after which they were blown north above the German Ocean. As a result of the failure of these races, and the dangers that developed, it is believed that next year dirigibles will be used.