

manufactures. These are subdivided so that no detail, however small, will be omitted.

The third section will discuss the statistics of commerce and postal relations. Many difficulties to the accomplishment of this work are anticipated. The principal is that of fixing a uniform nomenclature for the leading articles of commerce, without which it is almost impossible to arrive at satisfactory results, and also that of obtaining the true values of merchandise for use as a basis of comparison between aggregates. The fourth section will devote itself to discussions similar to those of the Prison Congress lately held in England—the statistics of criminal justice.

The more than ordinary importance of this Congress will render its proceedings of great interest, and we look for much valuable information from the results of its deliberations.

#### A NEW CANAL STEAMER.

We published not long ago illustrations of Captain Goodwin's improvement in canal propulsion, and spoke of it as one of the plans most likely to prove practical and successful. We are gratified to be able to state that a pair of these canal boats have lately been constructed by the inventor, at Buffalo, and in the course of two or three weeks they are to be put on trial on the Erie canal.

The peculiar features of the plan are, first, a floating propelling wheel, extending entirely across the bow of the boat, somewhat like those employed at the sterns of the Western boats. Second, cheek pieces extending alongside of the bow wheel, so as to enclose the water in front and cause it to be driven under the bottom of the boat as the latter advances. Third, a peculiar formation of the stern of the vessel, so as to admit of the connection therewith of a train of barge boats, which when united shall form a unity, so far as propulsion is concerned.

The two boats just built are each 96 feet long by 17 feet wide, and will have a carrying capacity each of 240 tons. The engine is of 40 horse power, capable of working up to double that power if required. It is expected that the two boats when connected will be propelled with a speed of from four to six miles per hour. Of the actual performances of the vessels, we shall give a report in due time.

#### THE NEW RAILWAYS ACROSS THE CONTINENT.

Colonel Thomas A. Scott, the celebrated railway projector and manager, recently made a speech before the wealthy men of New Orleans, inviting them to join in the construction of a railway from New Orleans to Shreveport, for the purpose of connecting New Orleans with the Texas & Pacific Railroad, of which Colonel Scott is president. In the course of his remarks, Colonel Scott stated that the Texas and Pacific Railroad, the construction of which is now rapidly progressing, will extend from Shreveport, La., to San Diego, Cal. There will also be a parallel connecting line, beginning at Texarkana, and running westerly to Fort Worth, in Tarrant county, Texas, where it joins the trunk line. Colonel Scott stated that the entire line from Shreveport to San Diego will be finished within six years, and if the citizens of New Orleans now join in the construction of the proposed road from New Orleans to Shreveport, they will be enabled by or before the year 1878 to take the cars in their own city and ride direct to the Pacific ocean. The Texas and Pacific Company expect to have five hundred miles of their road completed within the next two years. The portion of Texas through which it passes is very rich in agricultural and other productions.

Still another new transcontinental railway enterprise is in progress, that of the Atlantic and Pacific Railroad Company, lately incorporated under the authority of the Legislature of California. The line is to be located south of the snow line, so as to avoid the detentions which so seriously interrupt the Union Pacific in the winter time. This road is intended to connect with the Atlantic and Pacific Railway of Missouri, a portion of which, over three hundred and fifty miles in length, is already in operation west of St. Louis. It is asserted that the city of San Francisco will subscribe heavily towards this new road, as the citizens have become alarmed by the efforts of the Central Pacific Company to concentrate the entire railroad system of the State in their own hands, with the terminus at Goat Island—a project which, besides establishing an immense monopoly, is claimed to threaten the destruction of the present harbor of San Francisco, and the building of a rival city on the opposite side of the bay.

When these new highways are completed, we shall have four great railway avenues in operation across the continent, to wit, the Union Pacific, the Northern Pacific, the Texas and Pacific, and the Atlantic and Pacific.

#### IMPROVEMENTS THAT ARE MUCH NEEDED.

The steamer Bristol, one of the large and magnificent vessels that navigate Long Island Sound, plying on the Boston route between New York and Fall River, lately collided at Newport, during a fog, with a ship lying at anchor. The sailing vessel, which was loaded with railroad iron, was cut down and sank, while the steamer was damaged in the bow and was run ashore to prevent sinking. As it was, her hull filled. Steam pumps were sent for, which, in a few hours, set the Bristol again afloat and she was soon repaired.

The Bristol is a noble vessel. She was built at an expense of one million of dollars, with first class boilers, engine, blowers, indicators, hose pipes, etc. Her cabins are elegantly upholstered, adorned with gilt, lighted with gas; her twelve hundred passengers are entertained, during every trip, by regularly employed bands of music, are supplied with

good things from a generous larder, and served by an effective corps of the politest negro waiters. In short, the vessel is a floating palace, sailing with almost every appointment and luxury that money can supply. But in one most important requisite, namely, the means of flotation, the Bristol is sadly deficient.

The ordinary mechanic, not experienced in navigation, if asked to give his ideas as to the prime requisites for a passenger steamer, would naturally say that the first thing to do was to provide the most ample means possible for keeping the ship afloat. But it is just here that owners disagree with him, and the Bristol is a case in point. With an operating steam force on board of nearly three thousand horse power, she was unprovided with the means of rendering her power available for pumping, and sank ignominiously into the mud.

A decent regard for the lives of passengers, to say nothing of their own property, would seem to make it the obvious duty of the owners of the Bristol to provide her with pumps, equal, at least, to an emergency like that lately encountered. Had the accident occurred on the open Sound, instead of near the bank of a river, the vessel would doubtless have gone to the bottom, with loss of many lives.

We are aware that owners are desirous of avoiding the transport of dead weight, and hence they economize in pumps and other safety apparatus. But we believe it to be poor economy. They should place on board the most effective means for safety that can be procured, calling upon ingenious people to remedy any defects that experience suggests. The invention of improved means for the flotation of vessels in case of disaster is still urgently demanded.

We trust that some of our readers will investigate this subject specially, and study out some new and effective method of rendering available for safety, in the hour of need, the immense steam force of such vessels as the Bristol. The dimensions of this boat are as follows: Length 373 feet, beam 83 feet, depth 16 feet. Measurement, 3,000 tons. Diameter of cylinder 110 inches, stroke 12 feet, 2,800 horse power.

#### A NEW SUSPENSION BRIDGE.

The plans for a new suspension bridge over the Harlem river, at the high grounds in the upper part of New York city, have been prepared by the Park Commissioners. The bridge, as laid out on the drawings, will be about 1,800 feet in length, of which 734 feet will be within the jurisdiction of New York, and 1,066 feet in Westchester county. The roadway will be about 153 feet above high water level, and extend from the Tenth avenue to the heights on the opposite shore, west of the Croton aqueduct. It will be twenty-three feet higher than the present High Bridge, and form a convenient connection between the elevated lands of both sides of the river, affording favorable ground for foundations for piers and towers, and for anchorage for cables.

#### THE ELECTRICAL RAILWAY ALARM.

The bell rope commonly used on our railways, while it is very serviceable for short trains, is not of much use on long freight trains, because the weight and friction of a long cord is such that the rear portion of the cord may be broken without moving the forward portion. Thus, if the coupling of the rear cars of a long freight train breaks and the train separates, no alarm will be sounded on the engine gong, because the rear portion of the cord breaks while the front portion, to which the bell is attached, is not moved. An improvement which overcomes this difficulty consists in placing a magnetic bell hammer upon the engine, together with a small electrical battery, and in providing each car with a set of wires, joined by flexible joints, so arranged that while the train remains united all is well; but should any of the car couplings or wires break, the gong on the engine will instantly commence ringing. The same device may be employed by the conductor to give any signals that he may desire to the engineer, from any part of the train.

#### OLD AND NEW STEAM ENGINES.

The engines of the Cunard steamer *Scotia*, a large and splendid ship which plies between New York and Liverpool, are of 5,000 horse power, 100 inch cylinders, 12 feet stroke, very massive, elegant to look at, but of old style, side levers, entirely out of date, and very expensive to run. The ship burns 160 tons of coal a day and requires 1,900 tons for an Atlantic voyage. The new style of compound engines, now used on most of the ocean steamers, effects a saving of more than fifty per cent in fuel. Mr. F. J. Bramwell states that, nine years ago, the average consumption of fuel of the best marine engines was  $4\frac{1}{2}$  pounds of coal per horse power per hour, and that the same results are now obtained with a consumption of a trifle over 2 pounds of coal per horse power per hour. This is a wonderful improvement. The owners of the *Scotia* would make money by throwing away their present engines and substituting the new patterns. They might thus save 1,000 tons of coal per trip, and add 1,000 tons to the cargo capacity of the vessel.

#### THE COOLEST PLACE IN NEW YORK.

The coolest place to be found in New York in the summer time is the Pneumatic Underground Railway Tunnel, under Broadway, opposite the City Hall Park. When the thermometer stands at 90° in the shade on the street, if you go down into the pneumatic tunnel you find a temperature of only 65°. The projectors of this tunnel enterprise, which is pretty generally admitted to be the best plan for rapid city transit that has been presented, are obliged to wait the sanction of the State Legislature before proceeding any further with the

work. Meantime that portion of the tunnel which has been constructed under Broadway continues open to the public and forms a cool, clean, well lighted promenade, being withal an interesting place to visit. A narrow gage railway track is laid in the middle of the tunnel, in which a comfortable passenger car sometimes runs, being propelled on the pneumatic plan with much success. The great earth-boring machine remains motionless in the south end of the tunnel, waiting the legislative voice to give it renewed activity.

#### PROMOTIONS AT THE PATENT OFFICE.

W. Burke, lately first assistant examiner in class 25 "Clay and glass manufactures," has been appointed Principal Examiner in class 121, "Steam."

J. Newland, lately first assistant examiner in class 126, "Calorifics," has been appointed Principal Examiner in classes 61 and 98, "Hydraulics and Pneumatics."

Both of these appointments are the result of competitive examinations which were highly creditable to the successful candidates. Both are gentlemen of ability, and their appointment to the higher position they now occupy gives general satisfaction. They are well qualified, zealous, and industrious officers.

#### DIAMONDS IN ARIZONA.

Fabulous stories are told in the daily papers concerning the recent discovery of emeralds and diamonds in Arizona. Large quantities of these precious stones, found by prospecting parties, have been carried to San Francisco and put on exhibition. A great area of the territory where they are found has been secured and several joint companies formed, based on great expectations in the acquisition of diamond wealth. The richness of the new fields is alleged to surpass those of South Africa, and the famous mines of Golconda are dwarfed into insignificance. If the half that is told of the Arizonian discoveries is true, real diamonds are about to become more common than the paste article, and the occupation of the artificial manufacturers will soon be gone. One of these companies, by name the San Francisco and New York Mining and Commercial Company, announces a capital of \$10,000,000, of which a large proportion has been already taken. Probably a small amount of the stock yet remains unsold, which those who greatly want it can perhaps obtain, as a special favor, if immediate application is made.

The new diamond fields are located among the foot hills of the Pinal mountains in Arizona. The whole country round about is said to be rich in mineral wealth.

#### WHY IT HAS BEEN SO HOT.

The present summer has been characterized by unusual heats in almost every part of the Northern world, and all classes of philosophers, the weather wise especially, have been at their wits' end to account for it. Professor Tacchini has been making direct enquiries at headquarters, and has received the most satisfactory explanation. By means of spectrum observations and other carefully conducted experiments, he has discovered that for some time past our great luminary, the sun, has been throwing off immense and unusual volumes of magnesium gas from all parts of its surface. Magnesium is one of the most inflammable and fiercely burning substances in nature, when once set a-going, and the explanations of Professor Tacchini settle the whole matter. When the thermometer falls, it may safely be concluded that the supply of magnesium in the sun's atmosphere has diminished.

#### THE METEORS OF AUGUST TENTH.

The expected shower of meteors, predicted by the astronomers for August 10th last, did not make its appearance in the locality of New York. We observed few if any more meteorites on that night than on ordinary occasions; nor have we received reports from any quarter indicating that the earth went through the tail of any comet. It may be, however, that the plunge of our sphere into the cometary matter took place in the day time, the resultant meteors being then invisible.

TO RENDER METALS ELECTRIC.—T. Sidot has observed this phenomenon, and found that iron, silver, and aluminium, if the friction be sufficient, will give off electric sparks. To perform this experiment, take a perfectly dry tube of thick white glass and put in 15 to 20 grammes granulated silver, and 30 to 40 grammes pure bisulphide of carbon, and seal up the tube. On warming the tube slightly and shaking it in the dark, sparks appear in the interior, their number increasing with the violence of the agitation. The sparks disappear on immersing the tube in water.

CAUSTIC SODA.—A new method of preparing caustic soda is given by M. Tessié du Motay, in *Les Mondes*. One equivalent of sulphuret of sodium is mixed and fused with one equivalent each of caustic soda, hydrate of lime, and metallic iron (cast or malleable); when these substances are heated to redness, the sulphuret of sodium is completely converted into caustic soda, and sulphuret of iron formed. M. du Motay considers that the water of the hydrate of soda or lime is decomposed by the iron, which becoming oxidized, hydrogen is set free, oxide of sodium formed, and then sulphuret of iron; the soda being separated from the last named substance by lixiviation with water. In another process, the sulphuret of sodium is first converted into a basic phosphide of soda, and then into caustic soda by means of caustic lime.

The corporation of the city of New York have ordered a portrait of the late Professor Morse to be painted, to adorn the grand parlor, or Governor's room, of the City Hall.