The effect has been to permanently change the contour of portions of the Alaska coast. Many well-known islands have been swallowed up and others risen in their places, Landmarks well defined and known to every navigator of the coast have disappeared, and every glacier from Juneau and vicinity, including all those known to tourists in Glacier Bay and elsewhere, have suffered mutilation, which destroyed their wondrous beauty and leveled their mighty ramparts for thousands of feet back from the sea. In the Northwest Territory volcanoes are reported to have been seen in ranges where they were never before observed. Puget Sound was violently shaken, and in the distant islands of the Alaska Archipelago severe earthquake shocks excited intense alarm. Along the coast near Mount St. Elias the upheaval was accompanied by huge and devastating waterspouts, while enormous tidal waves rushed in from the sea with overwhelming power. Great rocks fell from the sides of the mountains and crashed into the valleys below. The earth moved with the awful velocity and undulation of the waves of the sea, shaking mountains from their bases and prostrating the huge forests that covered their slopes.

The date of the earthquake was September 10, though warning shocks had been felt for some time previous. Three white men were prospecting on the shores of Disenchantment Bay, which lies at the foot of Mount St. Elias and contains the great Hubbard glacier, which has been observed only by scientists and explorers, lying, as it does, far beyond the route of tourists, and about fifty miles west of Yakutat Bay. The prospectors were camped on a ridge separating a large fresh water lake from the ocean. A violent shock threw down the obstruction, and the great flood from the lake swept down the bank, carrying the three men along with it. Concurrently, a great tidal wave swept into the bay, which washed the men back again and left them high and dry upon the side of a mountain.

They describe the oscillation of the earth as terrific, and were witnesses to the destruction of the whole front of Hubbard glacier, with its face of solid ice extending several hundred feet above the tide. For a mile from the sea the glacier was fractured and thrown in the bay. The men fled to Yakutat Bay, fifty miles distant, and reached that point after a journey beset with peril. At Yakutat Bay, Rev. Sheldon Jackson, Educational Superintendent of Alaska, happened to be visiting. He graphically describes the tremendous convulsions accompanying the shocks, the undulating shores as the earth wave swept back and forth, together with the enormous tidal waves which rushed into the bay and were engulfed in the crevasses which opened along the shores. The terror inspired among the Indians at the Yakutat Mission was unspeakable, though no lives were lost.

The most disastrous and permanent effect of the earthquake is seen among the glaciers. Foster glacier, near Juneau, has had its beauty almost destroyed. All that portion of it fronting on Taku Inlet, which the sun had sculptured into wondrous and enchanting forms, has been thrown into the sea, and rumor asserts every glacier on Glacier Bay, including the Great Muir, has suffered the same catastrophe. Tourists in Alaska can never forget their first impressions of the mighty Muir glacier. It extends landward for over forty miles, a frozen river with over twenty lateral branches. It fronts upon the sea for two miles and a half, a wall of ice from two to three hundred feet in height. Soundings give it a depth of seven hundred and fifty feet below the tide, so that from base to summit it is a thousand feet high. From this wall of ice every minute there drops into the sea 45,000 tons of ice, or every day no less than 200,000,000 cubic feet. Reports are that the whole front of the Muir glacier and extending back for a mile has been cast into the sea. Occurring at a time when the coasts of Alaska were deserted, the full effects of the earthquake will not be known until next summer permits the advance of the tourist and explorer.

The Population of London.

Last year's statistics show that the population of London is 4,484,717. For every 1,000 inhabitants there were 30 births and 17·7 deaths. The number of infants who died in their first year was 158 for every 1,000 births. During the period extending from 1887 to 1896 the mortality was lower than in Paris, Brussels, Amsterdam, Berlin, and Copenhagen; but in 1897 it increased to such an extent that it is now very little lower than that of most European cities, Rome included.

The World's Corn Crop for 1899.

The world's corn crop for 1899 is 2,611,000,000. bushels, of which the United States furnishes 2,200,000,000 bushels; Austria-Hungary furnishes 98,000,000 bushels, a serious falling off from the 153,000,000 bushels of last year. Argentina comes next with 72,000,000 bushels, then comes Italy with 68,000,000 bushels. The crop is about 111,000,000 bushels more than the average crop of the last four years.

RAILWAYS OF THE WORLD COMPARED.

If the railway statistics for the whole world were as accurately and conveniently tabulated as are those of this country, it would be a simple matter to compare the various foreign countries among themselves and with the United States. One has not delved very far into the accumulated mass of statistics which are necessary for such a comparison before he begins to appreciate, as he never did before, the excellence of the statistics of the United States, as drawn up in our own "Poor's Manual," from which it is needless to say our data, as far as the United States is concerned, have been derived. There is no annual publication devoted to the statistics of European and other railroads that professes to have the same scope and thoroughness as the work referred to. In some of the countries, owing to the delay occasioned chiefly by governmental red tape, it is rarely that one can find statistics that are brought up to within two or three years of those obtainable for the United States. The figures for foreign countries given in the present article are based largely upon the Universal Directory of Railway Officials, an excellent work in its way, which is published annually in London. The totals as drawn up from this work, however, have been verified or corrected by statistics which we have personally obtained from the proper authorities in the countries themselves.

It is a well-known fact that while comparison by numbers conveys a very adequate impression up to a certain limit, when we pass this limit the mere statement of numbers is not sufficient. Hence the popularity of comparisons which are made by graphical representation.

TOTAL LENGTH OF RAILROAD TRACKS.—The group of locomotives on the front page represents the relative length of the total amount of railroad track in the leading countries of the world. It will be seen that the United States stands at the head of the list and easily forms a class by itself, with a total mileage of 184,532 miles. The other five countries represented can only total among themselves about 126,000 miles, the United States, therefore, having 58,000 miles more than all the rest together. We must bear in mind, however, that a mere comparison by the length of the track alone does not give an accurate idea of the relative importance of the railroads. There are many other considerations involved, such as the amount of rolling stock, the number of trains that are run, the number of passengers carried, the total amount of equipment in the way of engines and cars, and the total amount of freight that is carried. When all these features are taken into consideration, we find that the position of the United States is not so commanding, although she still has a pronounced lead over all other countries.

LOCOMOTIVES.—In a comparison of the number of locomotives, the United States comes first with a total of 36,746. Great Britain comes next with 19,602, or a little over half as many. Then follow Germany with 16,842. France with 10,502. Russia with 8,748. and British India has a total of 4,258. Now, by dividing the total length of track by the number of locomotives, the reader can make for himself an interesting comparison tending to show the density of the traffic in each country, the same point being brought out, of course, by dividing the total length of track by the number of passengers carried and the total tons of freight that are hauled every year. It will be seen that Great Britain has the largest number of locomotives to a given length of track, while the United States and British India have the smallest proportion to the mile. Here again an important modification must be made; for all locomotives are by no means alike in size and power, the American engine being a far heavier and more capable machine than those of Europe. Not only is the American engine more powerful, but it is more heavily worked, and if we were to increase the totals of the United States by 50 per cent, we should get a figure which more correctly represents the motive power of this country as compared with that of the others mentioned in our table. There are no locomotives in Europe to compare with the giant freight locomotives lately built by the Schenectady or Brooks works, which weigh over 100 tons without the tender, and are capable of exerting a drawbar-pull of 22 to 25 tons, and hauling on the level a train nearly a mile in length and weighing over 5,000 tons.

CARS.—In the table of the total number of passenger cars, it will be seen that the United States ranks as third, Great Britain coming first with the enormous number of 62,252, Germany being a poor second with 34,590, and the United States third with 33,893. Here again, as in the case of the locomotives, it must be remembered that the American eight-wheel passenger car is larger and has a greater carrying capacity than the English four or six-wheel passenger coach. In length it is approximately double and in passenger-carrying capacity it is from 30 to 50 per cent larger. The absence of any platforms or a central aisle on the typical English coach enables it to carry a larger number of passengers in proportion to its length than is possible on the American car; but nevertheless it is certain that the average American car has considerably larger capacity than the average English or European coach. At the same time we must remember that American ideas are very rapidly being adopted in the equipment of English and Continental roads, and the eight and twelve-wheel corridor or central aisle type is gradually taking the place of the smaller and less convenient "carriage" of former days.

FREIGHT CARS.—In the comparison of the freight cars the United States has an enormous lead, not merely in numbers, but also in the capacity of individual cars. With a total of 1,284,807, she has about double as many as Great Britain and about four times as many as France or Germany; moreover, the average American freight car is a giant compared with the European "wagon" or "truck," for while the latter has a capacity of five to eight or ten tons, the average American freight car will run from ten to twenty tons; so that it is not stating the case too strongly to say that the total carrying capacity of all the freight cars of American railroads is from three to four times as great as that of the English "goods wagons," as they are called, and about 100 per cent greater than that of all the combined freight cars of the five foreign railroad systems included in this comparison.

PASSENGERS CARRIED.—When we come to the statistics of passenger cars, Great Britain holds a commanding lead over all other countries, with a total of 1,062,911,000 passengers carried in one year. The United States comes next with over 698,342,000, including over 183,000,000 carried annually by the steam railroads of the Manhattan Elevated Roads, New York; Germany is a good third with 646,461,000. Then there is a considerable drop, France carrying 382,240,316, followed by British India with over 160,000,000, and Russia with a total of over 97,000,000. At first sight these figures are somewhat staggering, especially when we compare Great Britain with this country, and it will naturally be asked how, with about one-eighth as many miles of track, Great Britain should carry forty-five per cent more passengers. Here again there is a qualifying factor to be considered. The length of the average passenger journey in this country is considerably greater than that of the average railway-journey in England. This is due to the vast extent of country and the great distances that are traveled in the United States. There is, moreover, a far larger proportion of the British populace dwelling in cities, and a large percentage of the city dwellers are carried to and from their work by suburban passenger trains, the amount of suburban travel in greater London alone with its five or six million inhabitants being enormous; furthermore, the liberal provision of what are known as parliamentary and workmen's trains, and the remarkably low rent at which suburban cottages may be obtained, enables the British workman to become a suburban resident to an extent that is not possible in this country. Another explanation of the enormous passenger travel in England is to be found in the large number and great popularity of cheap excursion trains, which are run during several months in the summer. Travel of this kind, which is carried largely in the United States by the magnificent system of river and shoal-water steamers, is in England taken care of almost entirely by the railroads. The facts quoted will, in a lesser degree, explain the large totals of passenger travel in relation to length of railroad track in Germany and France.

TOTAL FREIGHT CARRIED.—As we should naturally expect in a country where the provision of freight cars is so generous, the total amount of freight carried in the United States is far in advance of that of any other country, the total given in millions being for the United States, 913; for Great Britain, 437; Germany, 276; France, 120; Russia, 97; and British India, 39 million tons. A curious fact is brought out in this comparison as between the United States and Great Britain, namely, that the British freight wagon is ordinarily loaded more nearly to its full capacity than the American freight car; for although, as we stated in a preceding paragraph, the capacity of all American cars is about four times that of all English cars, the total amount of freight carried is only double as much. Just here is to be found one reason why the large capacity of the American car is not suited to the English railroad system, where consignments to particular villages and small towns frequently have a whole car reserved to themselves, so that the car may be dropped at its destination and the train proceed without any delay of unloading. The English claim that by using a smaller car the proportion of the paying load to the dead load, that is to say, of the freight to the car, is larger than it would be if the large capacity American car were used. The truth of this contention certainly seems to be borne out by the figures referred to in our table.

THE Agricultural Department will make an interesting exhibit at the Paris Exposition covering irrigation methods in the West. A government expert will have charge of the exhibit, which will include photographs, working drawings and models of irrigation plants.

SCIENTIFIC AMERICAN

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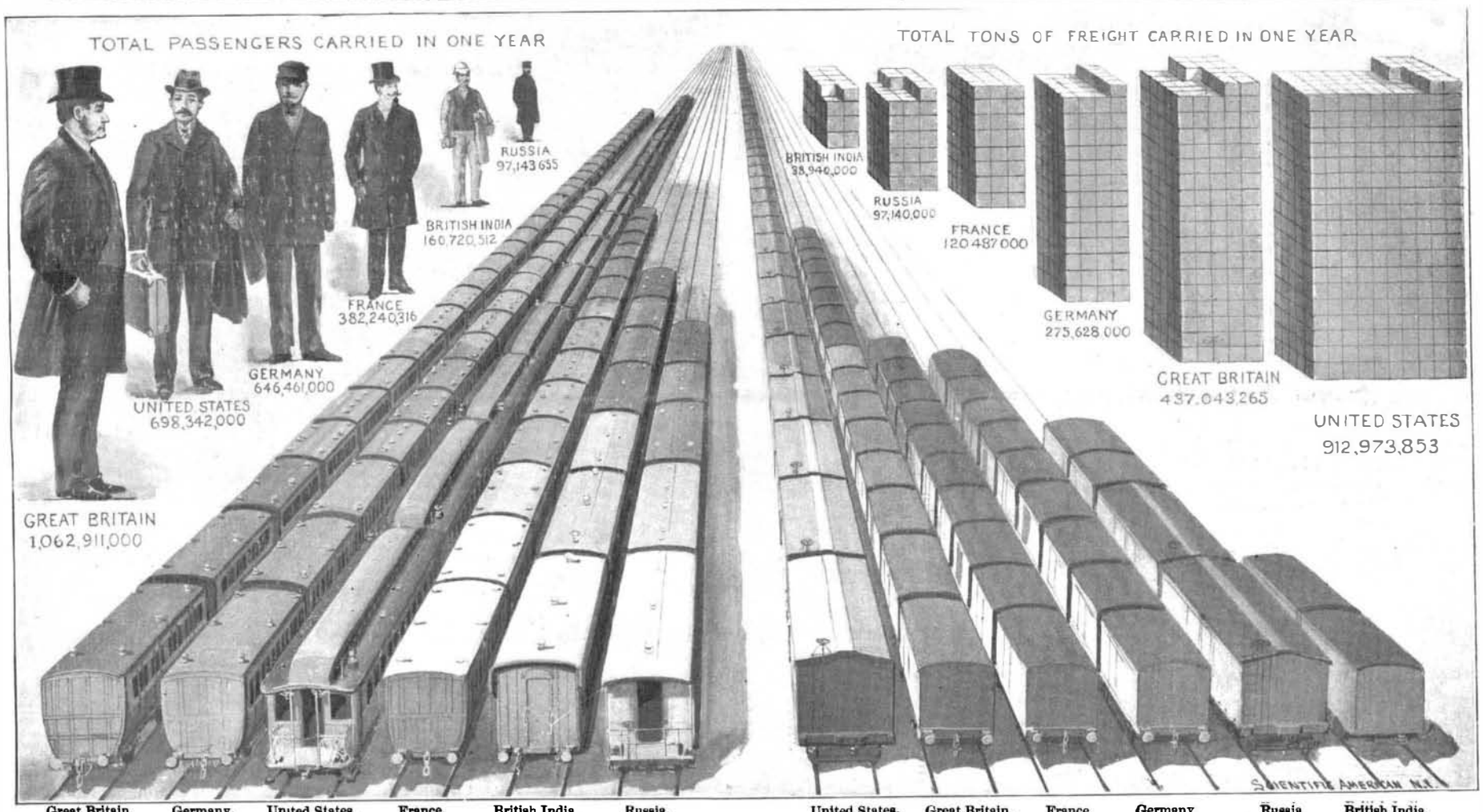

Great Britain,	Germany,	United States,	France,	British India,	Russia,	United States,	Great Britain,	France,	Germany,	Russia,	British India,
62,352	34,590	33,893	28,750	14,743	10,560	1,284,807	656,735	360,721	330,460	195,556	80,053

Total Number of Passenger Cars. **Total Number of Freight Cars.**

United States, 182,333 miles. Germany, 29,984 miles. France, 25,862 miles. Russia in Europe, 25,357 miles. Great Britain, 23,534 miles. British India, 21,543 miles.

Magnitude of the Leading Railroad Lines of the World Represented by Size of Locomotives.

RAILWAYS OF THE WORLD COMPARED.—[See page 406.]

Science Notes.

M. Henri Coupon has been experimenting with the action of anæsthetics on seeds. He shows that they do not injure the grain, but the insects that attack it are destroyed. Chloroform is recommended. The grain is, however, very sensitive to anæsthetic vapors, which retard their germination or kill them.

In Siam the liquid measure used is derived from a cocoanut shell which is capable of holding 830 tamarind seeds, and 20 of these units equal a capacity of a wooden bucket. In dry measure, 830 tamarind seeds make 1 "k'anahn," and 25 "k'anahn" make 1 "sat," or bamboo basket; 80 "sat" make 1 "kwien," or cart. This is an example of the primitive origin of most units of weights and measures.

The subject of green oysters has recently awakened considerable attention. They are more highly prized by many consumers abroad than the ordinary kinds. The opinion is widespread that the greening is injurious. The Marennes oysters are harmless, however, and the color does not depend upon the presence of a particular pigment. These oysters are very popular abroad. No trace of copper or iron has been found in them.

An extraordinary floor has been laid in the London Coal Exchange. It is constructed of inlaid wood, and the pieces are arranged so as to represent the mariner's compass. Some of the slabs of wood, of which there are altogether 4,000, have interesting historical associations. Thus the one forming the haft of the dagger in the city corporation arms is a portion of a tree planted by Peter the Great when he worked as a shipwright at Deptford.

Since the first of January, 1899, up to October 31, Consul Ridgely, of Geneva, estimates that no less than 2,500,000 tourists have visited Switzerland, and that they have each left in the country an average of 80 francs, or $15.44, or a total of $38,600,000. The population of Switzerland is 2,933,300. The per capita wealth of the country has hitherto been estimated at $14, but the influx of money brought in annually brings it up to $29.45, and from one of the poorest countries per capita to one of the richest.

Within the last eighteen years 8,670,120 square miles have been added to the colonial empire of the great colonizing powers. The total, not including Egypt nor the Soudan, is as follows:

	Square miles.
Great Britain	3,987,512
France	2,936,563
Germany	1,020,070
Russia	265,381
United States	160,601
Netherlands	123,677
Portugal	96,605
Spain	79,911

According to The Medical Record, the death rate for consumption in the State of New York, for the first eight months of 1899, showed an increase over the same period in 1898 of 669. Should this rate of increase prove to have continued the remaining four months, when the statistics have been compiled, the increase in 1899 will be about 1,000 deaths, and will reach 14,000 deaths from pulmonary tuberculosis in the year, the highest rate ever known in the State. Dr. John H. Pryor favors the appropriation by the Legislature of $200,000 for establishing a State sanitarium for incipient consumptives, believing that in caring for them at the proper place and time until they are well or improved, they can be saved.

We have received the first Annual Report of the New York State College of Forestry, for 1898, which contains full information regarding the valuable work which has been carried on. A demonstration area to be set aside for the use of the College in the Adirondacks was selected by Prof. B. E. Fernow, the Director and Dean of the New York State College of Forestry, after a careful inspection of the available sites, but it has not as yet been turned over to the College. It is estimated that between 1,000,000 and 2,000,000 feet of logs, and 5,000 to 10,000 cords of wood will be the actual growth to be cut annually off the 30,000 acres. Prof. Fernow desires an appropriation of $30,000 to promote the work. It is intended to manage the property for financial results as well as for demonstration of sylvicultural methods.

It has been suggested that copper-plated zinc be used for photo-engraving. It is fully equal to copper, and the copper-plating costs very little if done on a manufacturing scale. The zinc plates are carefully cleaned with potash to remove all traces of grease and they are connected to the cathode in an alkaline depositing bath, plain copper plates forming the anode. After five minutes the plates are removed and polished with whiting. They are then transferred to an ordinary depositing bath and allowed to remain for four minutes. On removal the plates are again polished with whiting. A fish glue sensitive coating is used on the copper plates, and after development, as usual, a 40 per cent solution of ferric chloride is employed for the first etching, two minutes being allowed; the copper film being thus dissolved, the etching is continued with 3 per cent nitric acid.

Engineering Notes.

It appears from British consular reports that Morocco offers a considerable field for the engineer. There are at present no roads, railways, telegraphs, canals nor harbors.

American locomotives are used on the Bombay, Baroda and Central India Railway. The extent to which American locomotives are being used abroad does not fail to awake voices of anguish among the foreign press.

The New York Railroad Commissioners, who have been testing the efficiency of various forms of brakes for use on street railway cars, finished their tests on November 23. A report on the twenty-one devices submitted will be made public in the course of a month.

On December 9, over 160 feet of the Place de l'Etoile fell down into the Metropolitan Railway tunnel. A number of trees were also carried away. Some fear has been felt for the Arch of Triumph. It is thought that the work of the underground railway which crosses the square may endanger it.

The South Kensington Museum is constantly adding to the collection of scientific instruments and models of old-fashioned machines. We learn from Industries and Iron that they have now made a large number of additions of modern machinery and tools such as a coal gas purifying house, a Belleville boiler, a launch engine, water-tube boilers using liquid fuel, a transformer, steam turbine, etc. Many of the machine models are shown in motion.

The first Bessemer rails ever made were rolled in 1856, and analysis shows that they had the following composition: Carbon, 0·08 per cent; silicon, traces; sulphur, 0·162 per cent; phosphorus, 0·428 per cent; arsenic, traces; manganese, traces; iron, 99·33 per cent. At that time the pernicious influences of sulphur and phosphorus were not known, and as the behavior of the rails was unsatisfactory, their manufacture was abandoned, and not resumed till 1864.

An imposing monument surmounted by a bronze statue, erected to Ferdinand de Lesseps at Port Said, was unveiled on November 17. It was the work of the French sculptor M. Fremiet. It stands on a small artificial island at the entrance to the harbor, so that it comes into view immediately one approaches the roadstead. The statue is nearly 20 feet high. In one hand it holds a map of the Isthmus of Suez and with the other hand it points to the entrance of the Canal.

Locomotives were built for English railroads in 1840 in the shops of William Norris & Company, which now form a part of the Baldwin Works. Four locomotives were built to work the Lickey incline of the Birmingham and Gloucester Railway, now a part of the Midland system. The engines weighed 21,500 pounds and the drivers were 48 inches in diameter. One of the four is said to have hauled a train of loaded wagons weighing 74 tons up a grade of 2·7 per cent at a speed of 9¾ miles per hour.

There were at the close of 1896, 2,284 miles of railway owned and operated by the Swedish government. There are 7,820 persons employed during the brisk season, and the rolling stock consists of 502 locomotives, 428 baggage cars, 892 coaches, 3 dining cars, 45 postal wagons, 6 combined coaches and baggage wagons, 21 prison vans and 12,161 freight cars. It is a curious fact that 30 deer were struck by trains, while only 6 horses and 18 cows were killed and injured in the same period.

A Birmingham company of railway coach builders are now constructing a hospital train composed of seven ambulance coaches and another concern is building a number of steel-plated railway bogie vans. They are plated internally and externally with Siemens-Martin steel. While they are not strictly speaking armored cars, they are fireproof and would stand a considerable assault. The cars are painted and stained to resemble teak, the wood of which the other carriages used on the Cape lines are now made.

The army transports "Logan," "Meade" and "Thomas" are model vessels for the carrying of troops, and they have an aggregate capacity of 5,000 officers and men. The fittings on all of them are most elaborate, and on the "Logan" include folding metallic bunks, supported by steel tubes and arranged three in a tier. Shower baths and a refrigerating apparatus for preserving fresh meat for issue en route are provided. A meat-chopping machine is operated by electricity and it has a capacity of 500 pounds per hour.

Special varnish for aluminium is made by soaking 100 parts of gum arabic in 300 parts of liquid ammonia. This is heated about an hour and then allowed to cool and the varnish is ready for use. The aluminium to be coated is cleansed with soda and allowed to dry in a warm place, and after having covered the surface with the varnish it is heated in a furnace to a temperature 300° Centigrade for a short time. After covering aluminium with a coating of this varnish, it can be painted and polished without any fear of scaling off or cracking.

Electrical Notes.

The Baltimore Fire Department is to have a search light similar to the ones which are being made for New York for use in fires.

Abyssinia has a telephone line 300 miles long connecting the capital and the important city. It was constructed by a Franco-Russian company.

The largest stationary steam turbines in the world are being built by the firm of C. A. Parsons & Company, for a municipal lighting plant at Elberfeld, Germany. They are 1,400 horse power each.

Ten thousand horse power will be transmitted from Garvin's Falls, fifteen miles from Manchester, N. H., to that city for lighting, power and street railway business. The water power is one of the finest in New England, and the new enterprise can hardly fail to be successful.

Twenty-five fire alarm boxes have been put into use in New York city as an experiment, and if their operation proves successful the same apparatus will be generally adopted. The boxes are arranged so that two or more alarms may be sent simultaneously over the same circuit without causing confusion, and each alarm will be recorded at fire headquarters. With the present system, when two alarms are sent in over the same circuit, confusion and delay often result.

An American company has been awarded the contract for the supply of all the trolley, feed and span wires for the equipment of the lines of the Havana Railway Company. The concession to convert the principal existing horse and steam tramways in Havana into electrically-equipped roads has also been granted. There are 54 miles of road in all. The feed wire will cost not less than $200,000. It will be the largest export contract for electrical wire ever placed in this country; 2,200 iron trolley poles have been ordered at a cost of $85,000. According to The American Exporter, the Havana company has also ordered sixty carloads of terra cotta conduit in this country.

Wireless telegraphic communication will be established between five of the Hawaiian islands by an American company. Although many engineers regarded the connection of the five islands by cable as impracticable on account of the coral reefs, an American company had, says The Electrician, about decided to attempt it, as the needs of telegraphic communication had grown most urgent. On hearing of the remarkable success of the Marconi system, the company investigated it and found that it would cost much less and be more practical in many ways than a cable. A regular telegraph business will be done by the company, installing the wireless system. The distance over which communication will be established will vary from 8 to 61 miles.

A correspondent of The American Electrician recently made use of some telephone apparatus for an alarm system. A bank vault was connected with a room of one of the officials in the same building, so that anyone attempting to enter when the switches were on would turn in an alarm. In the vault is a very sensitive telephone transmitter, the primary current of which is controlled from the receiving end. At the receiving end is a complete telephone and the necessary switches. When an alarm comes in, the person at the receiving end allows the current to pass through the primary of the induction coil of the vault transmitter and with his receiver can hear distinctly the slightest noise in or near the vault. With the aid of this system it is positively known if the vault is being tampered with before the police are summoned.

The ordinary method for the preparation of chromic acid to be utilized as oxidizing agent is the following, says The Trade Journals Review. Chromium sulphate is decomposed with lime, and the resulting paste of lime, gypsum, and chromium oxide heated to red glow. The chromate of lime thus formed is treated with sodium sulphate, which yields soluble sodium chromate and gypsum. To liberate the chromic acid we have again to add sulphuric acid, which is bound by the lime, yielding more value less gypsum. In several electrolytic processes the chromium salt is treated with caustic soda; but the electrolysis again yields sodium chromate, so that both the soda and the sulphuric acid are practically wasted. The Farbwerke, late Meister, Lucius and Brüning, have now worked out, on a large scale already, a new, less wasteful process. They start from a solution of chromium sulphate in sulphuric acid and fill both the anode and the cathode compartments with that solution. On the anode, chromic acid is liberated, on the cathode, hydrogen; in the former compartment the sulphuric acid concentration increases, in the latter it decreases. The anode lye can at once be employed for oxidation; during that reaction it is reduced to chromic oxide, which is returned to the cathode compartment, while the former cathode lye is transferred into the anode chamber. Thus a continuous process takes place. The decomposition requires 3·5 volts and a current density of 300 amperes per square meter. The electrodes are of lead, and the temperature of the cells is raised to 50° Cent.