Railroad Construction in 1879.

The total of the year was 4,430 miles, which is the largest since 1872, and has been exceeded only four times in the history of the country—the four years ending with 1872. For the eight years that we have made up this record, which includes road on which *track was laid* during the year, whether opened for traffic or not, and differs materially from the figures in *Poor's Manual* (which usually include only road open for business), the miles of new road constructed have been:

Year.	Miles.	Year.	Miles.
1872	7,340	1876	2,460
1873	3,883	1877	2,301
1874	2,025	1878	2,916
1875	1,561	1879	4,430

Compared with 1878, therefore, last year shows an increase of more than 50 per cent. At the close of 1878, according to *Poor's Manual*, the length of railroad in the country was 81,841 miles. Adding the mileage constructed in 1879, we have the grand total of 86,263 miles of railroad in the United States at the beginning of the current year, when the total of all Europe is about 100,000 miles, and of all the rest of the world probably not 20,000 miles. The increase in this country was at the rate of about 5½ per cent, the increase of population being doubtless something less than 3 per cent so that the number of inhabitants per mile of railroad has become less during the year. The population of the country is now probably about 49,500,000, and this gives 574 persons to support 1 mile of railroad, against 585 at the beginning of 1879. In Europe the average is about 3,333 per mile of road, and in Sweden, where the mileage in proportion to population is largest, it is 1,667. We have given these figures before, but we repeat them to emphasize the fact that this is peculiarly the railroad country, not simply because it is big, but because the same population requires a larger amount of railroad here than anywhere else.

Of the 4,430 miles, 923½ miles are of narrow gauge (18 miles 2 feet, 23 miles 3½ feet, and the rest 3 feet gauge). This is a little less than 21 per cent of the whole, against about 30 per cent in 1878.—*Railroad Gazette.*

Recent Explorations in Afghanistan.

For a period of about 40 years it has been known that interesting Buddhist remains existed in the Jellalabad Valley, although little or no attention has been given to their investigation. Mr. William Simpson, having been quartered for some months in the valley, with the force under General Sir Samuel Browne, has been able to visit most of the remains in that region and to make sketches of them, and the results of his investigations are given by him in a paper published in a recent number of the *Journal of the Society of Arts.* These Buddhist remains, says Mr. Simpson, are little more than mounds. Here and there the crumbling remains of a stupa may be seen, and fragments of walls can be traced in the heaps. The immense quantity of these mounds is astonishing; and, as it is known that these Buddhist establishments were monasteries, the extent of the remains seems to indicate in the past a population of ascetics alone far greater than the population of the present day. In the Buddhist period, the country must have been under a high state of civilization, where wealth abounded and art was cultivated. The vestiges of art still remaining show that the religious structures of the time were large and important. A style of architecture was followed in which sculpture was largely practiced, and in which the effect was heightened by the use of color and gold. The structures connected with the practice of the Buddhist faith were "viharas," or monasteries, places in which each monk had his cell, and with buildings for worship. One prominent form of the ritual was connected with structures which are now known as "topes" or stupas. "Dagoba" and "chaitya" are also terms used to designate the same kind of structure.

The Afghanistan tope, unlike those of Sanchi, Bharut, and Amaravati, have a square base. It is ornamented with a cornice and pilaster; large and imposing stairs are made to ascend to the platform formed by it above, on which the circular part of the tope stood. Among the topes in the Jellalabad Valley which are not quite reduced to the condition of mounds, the Greek influence is very distinctly marked in the architecture. The capitals are all Corinthian; and the more ornamental structures have a series of Corinthian pilasters, with base mouldings and friezes.

Regarding the monasteries little can be said, for scarce a vestige of them now remains. All throughout Afghanistan there is an immense number of caves. At Bamian, about a hundred miles north of Cabul, there is what may be called a city of caverns. At Hada, and at almost all the groups of topes, there are numerous caves associated with them. Nearly all of these, as a rule, are about the same size. They are merely arched recesses in the rock, about 12 feet high, of the same width, and about 20 feet long. That they were decorated with color is shown by the traces still visible in the decorations in a small group at Hada. Enough is left also to distinguish panels, in rows, with heads of Buddha or Buddhist saints with the nimbus. At Darunta there is a very large and remarkable group of caves. The rock above had monasteries and topes of an extensive character upon it. The most interesting of these caves are in a perpendicular cliff overhanging the Cabul river.

Mr. Simpson concludes his paper with a short account of the excavations made by him at the Anin Posh tope, near Jellalabad. Of this structure nothing is left but the lower part of the square base; and there is only a small portion remaining of the first course of masonry of the circular part of the tope, and which is 80 feet in diameter. The base is 100 feet square, and is ornamented with Corinthian pilasters. There had been an inclosure all round the tope, forming a courtyard about 500 feet square. Through this the principal gateway entered from the south, in a line with the original stairs on the south and north side of the tope. This approach was evidently an important construction. There was further evidence of what it had been in the remains of colossal figures, which were brought to light. The size of these may be judged of by the size of the feet, which were 23 inches long, and which were all that remained of the statue to which they belonged. On digging a tunnel into the center of the tope, the external wall was found to be composed of stones and slates, so arranged as to produce a diaper or checkered pattern—a style of masonry peculiar to all the remains of the Buddhist period. In his excavations, Mr. Simpson was fortunate enough to come upon the cell, which was formed of layers of slate, and was a perfect cube of 16 inches. In this small repository, which constituted the sanctum, in honor of which the monument had been raised, and to which the ritualistic ceremonies of the Buddhists were directed, there were found two handfuls of dark looking dust, which were probably part of the ashes of some noted holy man of the time, deposited after cremation—the rule of the Buddhist priesthood. On top of the ashes lay a golden relic holder, octagonal in form, about 4 inches long, and set on each of its faces with stones. Among the ashes were 20 gold coins, 17 of them Bactrian or Indo-Scythian and 3 Roman. These coins, which were in splendid condition, and the relic holder, were no doubt deposited as offerings along with the ashes at the consecration ceremony of the shrine. The coins are only a negative evidence toward the date of the tope; but from them it is certain that the latter is not older than the second century. How much later it may be is rather a difficult question as yet to determine. The Roman coins seem to show that Afghanistan was the way of commerce from Central Asia into India in remote times.

The Viscosimeter.

This is the name given to an instrument by means of which the viscosity of a sample of beer can be determined. It consists in its simplest form of a funnel-shaped vessel, the lower extremity of which is drawn out to a fine point, so that the internal diameter is as fine as a capillary tube. A certain quantity of distilled water being placed in the funnel-shaped reservoir, a determination is made of the quantity which will run through in a given time, say five minutes; for example, we will assume this to be 21 cubic centimeters; the same quantity of the beer to be tested is then placed in the instrument, and an observation made of the quantity running through in the same time, we will suppose this to have been 15 cubic centimeters. The viscosity is in inverse proportion to the quantity of fluid flowing through the tube in a given time; taking the viscosity of water at 1,000, we have the following proportion:

$$15 : 21 :: 1000 : V.$$
$$\therefore \quad V = 1400.$$

Many precautions have, of course, to be taken; all determinations must be made at the same temperature, and, if possible, at the same barometric pressure; any excess of carbonic acid gas should be previously removed from the beer, by shaking a portion of it in a bottle until no more gas is given off; if the beer is at all thick it must be filtered, otherwise some of the suspended particles may mechanically close up the capillary tube. The determination of the viscosity of beer is of value for many purposes, for any great excess is an unfavorable sign. Any tendency toward "ropiness" can be detected by this instrument. It would also probably be of considerable value to the practical brewer for testing his worts, with the view of determining the dextrine ratio. A dextrinous wort will run through much slower than a saccharine wort, and we think some very useful results might be obtained by the aid of this instrument. Its construction is very simple, and any one with but a slight experience in chemical manipulation may make one for himself.

Speaking Dictionary.

M. Lambrigot has invented a modification of Edison's phonographic matrices, by substituting stearine for the tin foil, and electrotyping the impressed surface. It has been suggested that these electrotypes, which can be made very cheaply, may render great service in the study of foreign languages, for they preserve indefinitely and repeat as often as may be desired words that are the most difficult to pronounce correctly. A true speaking dictionary might thus be made, an undertaking which the wildest fancy would not have dreamed of a few years ago.—*Nature.*

The Brussels Exhibition.

In a letter to the Secretary of State, Mr. Goodloe, Minister at Brussels, calls attention to the Industrial, Agricultural, and Horticultural Exhibition to be held in Brussels this year, from June 15 to October 15. No foreign exhibitors will be invited or allowed to participate, but there will be an excellent opportunity for foreigners to critically inspect Belgian products, and it is suggested that enterprising Americans who have some of their wares on hand can show them to a great assembly gathered from every section of Europe. They will not be allowed to show goods in the Exhibition Building, for the Exhibition will be strictly a national one—a feature of the celebration of the fiftieth anniversary of the existence of Belgium as an independent nation.

AGRICULTURAL INVENTIONS.

Mr. Benjamin Middleton, of Muscatine, Iowa, has patented a device for heating hot-beds, green-houses, and the like. It consists in means for forcing heat and moisture to plants through an unvarying surface of porous bricks, tiles, or other equivalent substances.

Mr. Alexander B. Campbell, of Albion, Wis., has patented an improved harrow coupling, which forms a flexible connection between the several harrow bars. It consists in a harrow coupling formed of a clevis attached to a harrow bar, the upper shank of which clevis is lengthened and terminates in an eye, into which a bar hook attached to the forward part of the clevis of the following harrow bar passes.

Mr. William Pendley, of Ludville, Ga., has patented an improved machine for planting seed, distributing guano, cultivating cotton and other plants, and for other plowing. It is so constructed that it may be readily adjusted for these various uses.

The Crops of 1879.

The Agricultural Department has published a comparative table on the crops produced in 1878 and 1879, together with the prices obtained by the producers, as follows:

Harvest.	1878.	1879.
Wheat, bushels	420,122,400	448,755,000
Corn, bushels	1,388,218,750	1,544,899,000
Oats, bushels	413,578,560	364,253,600
Rye, bushels	25,842,790	23,640,500
Barley, bushels	42,245,630	40,184,200
Buckwheat, bushels	12,246,820	13,145,650
Cotton, bales	5,216,603	5,020,387
Tobacco, pounds	392,546,700	384,059,659
Hay, tons	39,608,296	35,648,000
Potatoes, bushels	124,126,650	181,360,000
Price.		
Wheat	$326,346,424	$499,108,000
Corn	441,153,435	580,250,000
Oats	101,945,830	120,855,000
Rye	13,592,826	15,505,000
Barley	24,483,315	23,625,300
Buckwheat	6,454,120	7,860,488
Cotton	193,854,611	231,000,000
Tobacco	22,137,427	21,454,591
Hay	285,543,752	325,851,280
Potatoes	73,059,125	78,971,000
Total	$1,488,570,866	$1,904,480,659

This increase of some $415,000,000 in a single year is a most encouraging result. But there has also been a gain in other values besides those of the crops noted above. The statistician of the department, who is reported to be gathering material upon which to base a careful estimate of the total increase in certain other values during the year just closed, to include the increased price of real estate and mining property, expresses the opinion, based upon material already gathered, that it will not fall below $1,000,000,000.

Progress of Long Range Telephoning.

An important experiment with the telephone was made, January 25, between the Union Pacific Transfer on the east side of the Missouri River and the American Union office at St. Louis, a distance of 410 miles. The experiment previously made between Omaha and St. Louis had been unsatisfactory. Superintendent Dickey, of the telegraph lines, and also head of the Bell telephone system in the West; Manager Korty, of the Union Pacific Telegraph office, and Manager France, of the Omaha Telephone Exchange, conducted the experiment at this end of the wire, and Mr. Benedict, of the American Union, and Mr. Durant, of the St. Louis Telephone Exchange, conducted the experiment for St. Louis. Two jars, Callaud battery, were used at the Omaha end and five jars in St. Louis. But two or three interruptions of a few seconds each occurred, and these were clearly due to the "swinging" of the wires in the strong wind which was blowing.

An ordinary conversation was carried on with the utmost ease, the most noticeable fact being that, while the enunciation of the words was perfectly clear, they came invariably with the regular vibration of a musical note. The wires over the greater part of the distance were quiet and not in use, but at the St. Louis end there was a heavy induction.

Mr. W. H. Preece, in a recent lecture in London on sound, speaking of long distance talking by aid of the telephone, said that Prof. Bell and himself had carried on conversation through an instrument having a resistance that represented 10,000 miles of wire; in fact it was really a telegraph 10,000 miles long. He said there was no doubt whatever that if, like Jules Verne's hero, we could go to the moon and string a wire along that distance, there would not be the slightest difficulty in maintaining telephonic communication with the earth.

Aluminum Telegraph Wires.

German telegraphic engineers have lately been experimenting with aluminum as a material for telegraph wires. This metal can easily be drawn out to a very much finer gauge than is possible with iron, and its conductibility is twice as great as that of iron wire. Its excessive cost has hitherto prevented its use for the purpose indicated, but it is found that an alloy of aluminum and iron can easily be made, which will produce a wire both finer and stronger, and less susceptible to atmospheric changes than iron wire, while it is much superior as a conducting medium.