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NEW YORK, SATURDAY, AUGUST 27, 1904.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE SCIENTIFIC AMERICAN AND THE ST. LOUIS FAIR.

In spite of some rather serious but inevitable defects the St. Louis Exposition is unquestionably the most comprehensive and instructive of any that have been held in this country. Its chief drawback, as we have already stated in these columns, is its huge area size; but this was scarcely avoidable when once the sponsors of the fair had planned it on the vast scale upon which it has been built. The late President McKinley once spoke of expositions as being the timekeepers of progress, and in the intervening eleven years since the last great international fair was held in this country, such has been the feverish activity of industrial life, not merely in America but in every part of the civilized world, so vast have been the strides that have been taken in many of the industrial arts and sciences, that it seems to require an exposition of the magnitude of the present one at St. Louis adequately to record, in concrete form, the world's advancement during these eleven years.

If it be a difficult task merely to walk through the exhibits and see them with one's own eyes, it becomes a still more formidable task to serve as the eyes of the great multitude of readers of the SCIENTIFIC AMERICAN, and adequately set before them by pen and by picture a comprehensive review of the Exposition. Of the two alternative methods of doing this which presented themselves, that of publishing a special World's Fair number devoted exclusively to the Exposition was rejected, for the reason that it was altogether impossible to do justice to the fair in any single compact edition that would not be too cumbersome to serve its purpose. Consequently we have decided to distribute our World's Fair articles through the successive issues of the SCIENTIFIC AMERICAN and the SUPPLEMENT—a policy which will enable us to place the subject more exhaustively before our readers than would be possible in a single issue. Our editor has just returned from a two months' residence on the grounds, and the material that he gathered will be used in the form of illustrated and descriptive articles that will appear in our various publications during the next few months.

RAILWAY SPEEDS HERE AND IN EUROPE.

There are some controversies that will not down, and one of the most persistent of these is that relating to the relative speed of railroad travel here and in Europe. We have been in receipt lately of several letters asking us for an expression of opinion on the subject, and we therefore think it well to state, for the benefit of those who are interested in the question, that in respect of the number and speed of fast express trains, our railway service in this country simply cannot compare with that of France and England. We say this with the full knowledge that there are a few fast expresses that maintain a high average speed for long distances in this country—trains which, if the element of total distance be taken into account, as in the case of the Twentieth Century Limited, on the New York Central and Lake Shore lines, have no competitor in Europe. There is also a service of very fast trains running between Philadelphia and Atlantic City, during the summer months, which are scheduled to run at a higher speed than the fastest of what might be called short-distance expresses in other countries. But when it comes to a broad comparison of fast express service in France and England with that of the United States, we may as well confess to the uncomfortable fact that our service, taken as a whole and judged merely with regard to its speed, can scarcely be entitled to be called first-class. After we have eliminated the Empire State Express, with its average speed of about 54.5 miles an hour between New York and Buffalo; the Twentieth Century Limited, with its average speed of about 50 miles an hour from New York to Chicago, and the service of a few fast trains from Philadelphia to Atlantic City, maintained during the summer months, we have mentioned all of the trains that can be presented in comparison with the remarkable service that is being run on regular schedule this year on the other side of the Atlantic.

It was only a few years ago that the French railroads took the lead from England by putting into service several trains that ran at average speeds of from 55 to 60 miles an hour. At the present time there are in France thirty-five trains that are booked to run at speeds from start to stop of 55 miles an hour and upward. The fastest of these runs from Paris to Longeau, 79 miles, at 60.8 miles an hour; another is timed to do the distance from Paris to Busigny, 112½ miles, at 60.3 miles an hour; the next fastest run is the 109 miles from Paris to Abbeville, at 60.2 miles an hour, and the fourth fastest train runs from Paris to St. Quentin, 95¼ miles, at 60.1 miles per hour. Then follow seven trains, with a timed speed of from 58 to 58.6 miles per hour; eleven trains at from 57.1 to 57.8 miles per hour; and ten that run at an average speed of from 55.0 to 56.5 miles an hour. These runs are made without a stop over distances that will average about 85 miles.

During the past two years the English railroads have been building more powerful engines, and the result is seen in a greatly-accelerated train schedule. They have regained the lead in fast express service by putting in regular service a total of fifty-three daily trains scheduled to make a speed of 55 miles an hour and over from start to stop. The fastest run of these is over the 44¼ miles from Darlington to York at 61.7 miles an hour; but the most meritorious are the runs from London to Bath, 106⅛ miles, at 59.4 miles; from London to Bristol, 118½ miles, at 59.2 miles; two trains between London and Exeter, 193¾ miles, at 56.7 miles, and three at 55.3 miles an hour. These last-named trains are run on the Great Western Railway, on which a train carrying the American mails was recently run from Plymouth dock to London, a distance of 246¾ miles, at an average speed of 65.49 miles for the whole journey, the last 36 miles being covered at the rate of 79.17 miles an hour. The fifty-three daily expresses that run in the British Isles include twenty-four trains with a schedule speed of 55.1 to 55.8 miles an hour; thirteen trains with a speed of from 56.2 to 56.9 miles an hour; seven trains of from 57.0 to 57.8 miles an hour speed; five trains of from 58.1 to 58.9 miles an hour speed; three of from 59.1 to 59.4 miles, and one of 61.7 miles per hour schedule speed. The average distance of these runs, start to stop, is 101 miles.

It must be understood that this comparison is made merely on the basis of the actual number of high-speed trains available to the traveling public. No account is taken of train weights. Compared with American train weights these European trains are light; but so are the engines. Moreover, though the trains are lighter, their carrying capacity, owing to the lighter construction, is equal to that of our larger and heavier trains, so that the passenger is still the gainer. It would not pay to run so many trains at such high speeds in the United States, for the reason that our latest Pullmans weigh over 60 tons, or over 2 tons to the passenger, which, from an engineering point of view, is an absurd proportion. The only argument in their favor is that such heavy cars are safer in a collision; but would it not be a saner policy to build our cars lighter, abolish collisions, and operate our railroads with the same care that enabled the English roads, in spite of their many fast trains, to operate their railroads, as they did the year before last, without killing a single passenger?

Surely this is a problem worth consideration.

A GREAT RAILWAY SCHEME.

The government of Canada has entered into partnership with a newly-incorporated company for the construction of a transcontinental railway from the Atlantic to the Pacific, to be wholly within Canadian territory. This road will be about 3,600 miles in length; and the total cost is estimated at $150,000,000. This does not include the branch lines, aggregating about 2,000 miles.

The western division, extending from Winnipeg to the Pacific, is to be constructed by the Grand Trunk Pacific Railway Company, a chartered corporation, not yet organized, to be controlled by the Grand Trunk Company, which will be the majority stockholder. The line from Winnipeg to the Atlantic terminal, at or near Moncton in the province of New Brunswick, will be built by the government, and leased to the Grand Trunk Pacific Company at a 3 per cent rental for fifty years.

From Winnipeg to Edmonton, about 800 miles, the line will run through a prairie country, paralleling or intersecting branches of the Canadian Pacific and Canadian Northern railways. Northwest from Edmonton, for 300 miles to the foothills of the Rocky Mountains, there are no engineering difficulties until the route enters the valley of the Upper Peace River. Following this valley through the Rockies, the surveyed line reaches a point where a southerly turn brings it to the canyon of the Skeena. By a tortuous and difficult route through the Coast Range, the line finds its western terminal at or near Port Simpson, within a dozen miles of the recently defined southernmost point of the Alaskan boundary. An official statement presented to the Senate gives the length by the surveyed route, through the mountains, as 766 miles. This makes 1,886 miles for the total length of the division, Winnipeg to the Pacific, to be built by the company.

The surveys of the eastern division have not yet made sufficient progress to permit a definite location of the route. The most favorable line will probably be found north of the height of land, crossing a succession of valleys which have their outlet in Hudson's Bay. The St. Lawrence River will be traversed by the great bridge now under construction a few miles west of Quebec city. Between Quebec and Moncton, the line will come very near to the boundary of the State of Maine, until the valley of the St. John River is reached, thence a choice of routes is presented to the seaboard.

The government provides the cost of the eastern division. For the western division, bonds issuable by the Grand Trunk Pacific Company are to bear government guaranty of 3 per cent in respect of three-fourths of the total amount; the interest on the remaining fourth part is to be guaranteed by the Grand Trunk Company. The government guaranty, however, becomes operative only on the completion of the railway from Winnipeg to the Coast. Interest upon outlay in construction is to be capitalized. The western division must be completed by December 1, 1911.

THE ROMANCE OF LIGHT.

There are few objects in daily use about which we stop to ask how they came to us, and through what stages of development they passed before arriving at that perfection which we now enjoy. Should we turn a retrospective eye toward "those good old times," we should be amazed at the slow steps of progress, and the almost infinite struggles through which inventions came into acceptance.

The connection between a burning fagot and an electrolier may seem remote, but every link in the chain is perfect. From the smoky rays of the first flaring brand of the cave-dweller, to the electric light, filling the most spacious halls with its glory and making the streets of our cities luminous as the day, the way has been paved with human effort and illumined by human genius.

The pine torch was no doubt coeval with fire in the hands of men. The resinous knot was the first step in artificial illumination. Its use is found in every savage tribe and nation, while it is a necessity in the lives of all first settlers in new countries. When the nineteenth century dawned, the children of America were learning to read by the light of pine knots and the crackling of logs of an open fire-place; so closely are we related to what may seem the remote past.

It is hard to believe that the world groped on to the thirteenth century without discovering even the tallow candle; yet so it is. The expression that "mankind was plunged in darkness during the early ages" is true in every sense. It was perhaps the accidental burning of a bit of fat of some slain animal that suggested its use as a luminant, while the hollow shell from the sea, a concave rock, or a mold of sun-baked clay held the fat, which was burned by placing a rush in the fat, with the lighted end projecting over the edge of the rude dish. Step by step the lamp was fashioned into a thing of beauty, though barely a joy forever. Thus came the first improvement in the art of domestic illumination.

Admirable specimens of lamps in terra cotta, in stone, in brass, and in bronze have been found on sites of Hebrew cities and in the temples of Hindustan. From the tombs of Egypt; from the tumuli of Assyria and ancient lettered Babylon; from the opened graves of Chaldean sages, come examples of household lamps, revealing a general use many centuries before the Christian era. Herodotus speaks of a procession of lamps, as a scene of imposing magnificence, and Homer sings of a torch borne upon a staff, its flame no doubt feeding upon the wax from the wild honey, and the resinous gums of the forest trees, nearly a thousand years before the Christ.

So, from the fat of slain animals, the resinous products of the forest trees, and the wax of the wild bee came those lights which gleamed upon fair women and brave men at Belshazzar's feasts, the revels of Dives and the grand balls given by the first Napoleon in the Palace of the Tuilleries.

When men discovered the art of extracting oil from the olive and other vegetable sources the use of the lamp became very general among the wealthy and noble. Only they could enjoy the less offensive methods. Lamps wrought in cunning form of marble, silver, and gold were ornamented with precious stones, inlaid with curious handicraft and artistic workmanship indicate a high position for this method of illumination. Even the terra-cotta specimens, used in