

## SCIENCE:

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A MOVEMENT IS ON FOOT to celebrate the four-hundredth anniversary of the discovery of America by a world's exhibition to be held in this city. The time before 1892 is considered short for the satisfactory organization of such a vast undertaking; but, as the suggestion meets with general approval, it is likely to be carried forward to success. As to the location to be chosen, considerable discussion has begun, many opposing a proposal that the buildings should be erected in Central Park. This opposition argues, and as it appears justly, that the use of the park for such a purpose would interfere with its legitimate use as a pleasure-ground for at least a year, and that the injuries inflicted on the grounds could not be effaced in ten years. Some spot farther up on the island is more likely to be chosen,—a spot which, with the means of rapid transit which already exist, and which could be added to without much outlay, would be of easy access. We look forward to a rapid and satisfactory development of the plans for the exhibition; although, of course, as Americans do not seek any but a home market for their goods, the main stimulus of such a fair is not so strong as with Europeans.

ON JULY 9 the President appointed Professor T. C. Mendenhall superintendent of the Coast and Geodetic Survey. Professor Mendenhall was born in Ohio in 1841. From 1873 to 1878 he was professor of physics at the Ohio State University at Columbus. In

1878 he went to Japan, where he organized a physical department in the University at Tokio, as well as a weather bureau for the country. On his return to this country, in 1881, he again assumed the chair at Columbus, and in 1882 started the Ohio Weather Bureau. In 1884, Professor Mendenhall was called to Washington to take charge of an electrical branch of the Signal Office, and during his stay in the government employ also busied himself in developing a system of earthquake observations in the United States. Since 1886 he has been president of the Rose Polytechnic School at Terre Haute, Ind. In the new work Professor Mendenhall has undertaken, his many friends will wish him all success.

The last Congress legislated Mr. F. M. Thorn, the late superintendent of the Coast Survey, out of office at the close of the fiscal year. It provided, in an appropriation bill, that he should be appointed by the President, "by and with the advice and consent of the Senate." The proposed change of the law was submitted to Mr. Thorn by the Senate sub-committee on appropriations, and his opinion was requested as to the advisability of its enactment. He replied that he regarded as entirely unobjectionable the requirement that the superintendent should be appointed "by and with the advice and consent of the Senate," and that he had no personal interest in it whatever. His resignation was written on March 6, but was withheld at the suggestion of Senator Allison until April, when it was sent to the President. On June 22 Mr. Thorn directed the attention of the President and Secretary Windom to the law requiring the appointment of a superintendent to be made at the beginning of the fiscal year. He has not since discharged any of the duties of the office. Although Mr. Thorn was not a scientific man, like all of his predecessors, yet it is believed, that, as a result of his excellent executive ability, the forces of the office have been so employed during the past four years as to greatly increase their efficiency.

## MASTER AND WORKMEN.

THE greatest interest attaching to the Petit-Bourg Works, for the manufacture of light railway material, twenty miles from Paris, is to be found in the relations that exist between the master and workmen. As described in *Engineering*, a system of almost military discipline prevails everywhere. With the exception of a small number of hands, all work is paid for by the piece, and every thing that fails to pass a rigid inspection is condemned at the expense of the men. The hours of the work are long,—fourteen hours a day,—and Sunday is only observed as a holiday after two o'clock. Yet the men are contented and prosperous, and are the first to stifle and exclude the spirit of discord which too often prevails in the factories of adjoining communes. Workmen are always eager to obtain service at Petit-Bourg, and, once there, are loth to quit it. The secret lies in the fact that the men like to be governed, and that their material welfare is always carefully studied. Comfortably fitted up dwellings are provided for the unmarried men, in which they can rent a well-furnished bedroom for 1½ pence a day, or for 2½ pence if two live together. Then a clean and attractive restaurant is close at hand, where well-cooked meals are furnished at prices just sufficient to pay expenses. Married men are not allowed to use this restaurant, but they can purchase and take home with them their meals at a somewhat lower price, so that all the expense and trouble of cooking is saved them. In this restaurant a separate room is provided for the use of the foremen, the scale of charges being the same; and a general shop is attached, where every thing can be purchased at the lowest possible rate. For those men who wish to save the expense and trouble of going to the restaurant at meal-times, a range of ovens is provided within the works, and placed under the charge of a superannuated employee, whose duty it is to receive the food brought by the men, and have it comfortably prepared when the breakfast or dinner hour comes. The men are paid monthly, and are allowed to open credits to fixed amounts with the restaurant and shop, the balance due to them being paid at each settlement. Pay-day is celebrated

by the works being closed for three days, during which time the men have absolute license to get drunk if they feel so disposed, the fact being that about one per cent avail themselves of this privilege. Drunkenness at another time is followed by dismissal. The married workmen are provided with comfortable cottages surrounded by gardens, and with rents varying from six to twelve francs a month, according to their size and location. A bonus is secured to them on each addition to their family, in the shape of a monthly reduction in their rent; and long service also secures a further reduction. By this arrangement the cottages gradually fall into the absolute ownership of the workmen, and a most powerful inducement for steadiness and content is thus secured. The single men are also allowed to have a plot of garden if they desire it, and this is found to be a great attraction in taking and keeping service under M. Decauville. The result of this wise administration is seen in the fact that the Petit-Bourg colony possess savings to the extent of 200,000 francs, which are not invested in savings banks, but in the works themselves, where it receives a guaranteed interest at six per cent. Workmen are insured against all accidents by M. Decauville, who encourages and assists the several benefit societies, which are mainly supported by the workmen themselves. But the glory of Petit-Bourg is its theatre, — a substantial and really elegant building, 100 feet long and 39 feet wide, capable of seating about 500 persons. This theatre is nicely fitted up, and has a capacious stage, with appointments that would do credit to many a provincial town. Here about four performances are given a year, not by third-rate actors representing sensational drama, but, when it is determined that a performance shall take place, subscriptions are raised among the employers, the foremen, and the men, a committee is formed to negotiate with some good Paris company, and every thing is arranged admirably. It may be mentioned, in passing, that the "Maitre des Forges" is a never-failing favorite. But, besides theatrical performances, the theatre at Petit-Bourg serves other purposes: it is the gathering-place on all political occasions, at which, needless to say, M. Decauville presides in his capacity as Monsieur le Maire; it is the scene of numerous concerts given by the Petit-Bourg band, formed exclusively of Decauville workmen; the corps of Sapeurs-Pompiers, also from the works, hold their meetings and celebrations here; and in the theatre M. le Maire distributes prizes gained in the schools which he controls.

Altogether the Petit-Bourg colony leads a happy and prosperous, though a laborious life; and if M. Decauville can succeed in the future, as he has done in the past, in saving the district where he and his family have ruled for so many generations from the contagion of discontent and communism, Petit-Bourg will continue in its prosperity, and its hard-working population will remain contented.

#### THE TRANSMISSION OF ENERGY BY COMPRESSED AIR.

WE have not before us any data to show the actual development of the Compagnie Parisienne de l'Air Comprimé, but a statement of the number of installations in active work towards the close of last year will serve to give an idea of the number and variety of industries which have availed themselves of this means of obtaining motive power. Since then, the number of subscribers has largely increased, and one section of the great public lighting scheme of Paris has been carried out by the company. At that date there were, says *Engineering*, seven central stations fed from the installation at St. Fargeau for the distribution of electric light. They represented a total force of 750 horse-power given off by the air-motors; and of these, six were of 100 horse-power each. Four theatres, fourteen cafés and restaurants, two hotels, the same number of newspaper-offices and of clubs, and sixteen private houses were electrically lighted by the same means. Sewing-machines were driven in thirteen different establishments, ice was produced in four, and the air formed the motive power for driving machine-tools in thirty-four different shops. Sixteen printing-offices availed themselves of the same means, and in thirty-five other establishments it was also employed. Among the various applications there were a number of sanitary establishments that were on the

list of subscribers; in six instances it was employed for raising wines and spirits; it was also used for working lifts, shearing metals, and cutting stuffs, for ventilation and for driving mills, and to a large extent for wood-working machinery. At the end of last year, over 1,200 horse-power was distributed daily through the mains. Of this, 478 horse-power found employment among 276 subscribers for various industrial purposes, and 803 horse-power was absorbed in supplying 6,220 incandescent lamps and 145 arc lamps. Since that date, the demands of subscribers have gone on increasing until the reserve of engine-power at St. Fargeau was of necessity absorbed to supply the existing demands, and it became necessary to extend the main station. At the end of last year the situation of the company appears to have been as follows: the subscribers who had made themselves liable for periods of from five to ten years brought in a revenue from various industries of \$12,000; for lighting, of \$92,000; and for the pneumatic clocks, of \$19,400. Besides these, there were a number of subscribers who paid by the records of their counters. Of these, \$14,600 was paid for miscellaneous industries, and \$32,000 for electric lighting. At that time, also, several important installations were in progress which have since been finished. Among others was the Bourse de Commerce, who spent \$20,000 on an installation; refrigerating companies paying \$20,000 a year, and the Eden Theatre \$24,000 a year; there were also a number of miscellaneous applications, amounting to \$16,000 a year. These sums together brought the total revenues of the company to about \$170,000 a year, the expenses being \$152,000 for that part of the installation which was in full operation. This sum included interest on loans at 6 per cent, and interest on capital at 5 per cent. At the beginning of the year the works were not running at any thing like their full capacity, so that a large amount of capital on which interest was being paid was earning nothing. The financial condition became more favorable a short time later, when a large number of other installations were completed. It is said that this year the company will be in a position to pay regular dividends of 10 per cent upon its share capital; and, if all that is claimed for the system be substantiated, there appears to be no reason why such a rate of interest cannot be maintained or even exceeded.

*Engineering* does not hold itself in any way responsible for the figures given. They were furnished by the company, whose good faith is evident, because they court investigation, and are even now making arrangements for a series of trials to be conducted by wholly independent experts. Naturally the most interesting feature of the system is that by which the efficiency of the compressed air is claimed to be doubled by the application of heat and of a certain proportion of water. Apart from the inconvenience resulting on the extreme cold produced at the exhaust, for large motors at least, the permanent success or failure of the system depends upon the high degree of efficiency that can be obtained. For small motors this question is comparatively of little importance, because, even with an efficiency of 30 per cent, the balance of advantages would rest with the compressed air as compared with power produced by other mechanical means or by manual labor. The great electric-lighting installation which the company has just completed between the Rue Royale and the Opera will afford, after a few months, absolute data as to the relative economy of the system, and a means of comparison between it and the other installations of the other electric companies. Under every aspect, this great industry for the transmission of power, of which the station at St. Fargeau is the centre, is a most interesting one; and it may be predicted with certainty, that, if the reports of independent engineers confirm the statements by the company, applications on an equally large scale will soon be at work in other cities besides Paris. In a great many instances the advantage of being able to promote ventilation and to obtain a supply of pure air in the workshop is an advantage of great importance, and is one that is shared by no other medium of energy after it has done its work. Unlike the waste products from the gas-engine, or exhaust steam, or the discharged water from a hydraulic motor, the expanded air, after having done its work in the cylinder, can be turned directly into the apartment where the engine is at work. There are so many other purposes to which the system may find an application, that its field of usefulness appears to be a very wide one indeed. For