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THE DOMESTIC TELEGRAPH.

Not many evenings ago, an intelligent, gentlemanly looking individual presented himself at our door and asked "if we didn't want the district telegraph put into our house." At the same time he handed over for our examination a very pretty little instrument, composed of cog wheels and somewhat resembling a clock. "We attach the instrument to the wall," he said, "in some convenient position in your house, and to it we connect a wire leading to your roof, where it unites with another wire that extends to one of our district offices on Broadway." Pointing to a small knob, he continued: "If a fire breaks out in your house, you just push that lever, and in three minutes the firemen will be here. If thieves break in, you move that other lever, and in three minutes the policeman will make his appearance. If you want a special messenger to go upon any sort of business, night or day, you just turn this little button, and in three minutes the man will be at your door ready for service. The signals you thus make are all received and recorded at our Broadway office, where we keep a force of attendants, in readiness at all hours, to execute the requirements of our customers. Your wife or any other intelligent person can make the signals. We make no charge for putting the instrument into your house or for keeping it in order; but you pay us \$2.50 per month for its use and fifteen cents an hour for the time occupied by our messenger in doing your business. When you go away to the country in summer, you can have an attachment put on, so fixed that, if burglars attempt to break in, an alarm will be sounded at our office, when our policemen will quickly surround the house, and catch the thief in the act."

We rather liked the idea of having such a telegraph in the house, gave the order, and it was promptly put in.

In the course of a week or so afterwards, thinks we to ourselves, that is our wife and we, "let's try our telegraph just for fun, and see whether the telegraph folks are as wide awake as they pretend, or whether they are napping." This was early in the morning, just between getting up time and breakfast—before business begins—the hour when night hands go home and day hands have not yet come—the time when the manager is probably not on hand. Now let's see what this new-fangled telegraph is good for. So we pressed the knob, and there followed a slight click and a buzz. We looked at our watch, went down stairs, took seats at the breakfast table, when we were startled by a ring at the door bell. "Messenger from the District Telegraph Office. Got your signal. Wants to know what is wanted," was the report that came to us. Looking at the watch we found that just two and a half minutes had elapsed since we gave the signal. We felt a little bit sheepish in being obliged to tell the messenger that we had sent for him "just for fun, to see if he was really awake," etc., and as we were entirely satisfied on that point, he retired, sorry that we had no real business for him to do.

After breakfast, we went to the company's office, where we found a Morse paper recording apparatus, with which the various dwelling houses in the district are connected. Whenever a signal is given from any of the houses in the circuit, a gong sounds in the office, which notifies the attendant, and at the same time the telegraph clock work is set in motion; the paper moves, and upon it a signal is stamped and re-stamped or repeated. Each house instrument gives a different signal, and the various signals, with the names of the occupants and numbers of the respective dwelling houses, are registered or tabulated on the wall, like a hotel indicator. By glancing at the register, the attendant sees at once from what house the signal has come, also its nature, whether a fire has occurred, a robbery going on, or a messenger needed.

The office is in connection with the city fire telegraph and police offices, and instant signals are sent thither if required.

Taken altogether, this district or domestic telegraph is a most useful and valuable institution, promotive of comfort, convenience, and safety of families. That it will soon come into general use, cannot be doubted. The wires are so arranged that in case they are severed, either by design or accident, an alarm is instantly sounded at the district office and the repairs are quickly effected.

SUMMER HEATS IN VARIOUS COUNTRIES.

For the benefit of our readers who are suffering under the effects of the present heated term, we have collected, from various sources the following, relative to the extreme summer temperature of the different countries of the world.

Thibet, situated in Central Asia, between the thirtieth and thirty-eighth parallels of north latitude, is a decidedly hot country, so hot, indeed, that even the fiercest heat which the firemen in a sea-going steamer have to endure is comparatively insignificant besides its midsummer temperature. "Misery loves company," and as the reader sits slowly melting with thermometer at 98° Fah., he will probably gather consolation from the knowledge that the unfortunate inhabitants of the above mentioned country are worse off than himself. The intense heat, reaching 150°, doubtless prevents their remaining either in their houses or their garments during the day, but such is the inconstancy of the weather that if they venture to remain out doors or to continue in their primitive costume throughout the night, they may possibly be frozen to death before morning.

Senegal in Africa and the island of Guadeloupe in the West Indies are next to Thibet in summer heat; the weather is variable, but often reaches a temperature of 130°. Still more changeable is the climate of the Great Desert of Sahara, where the thermometer, after rising to 130° during the day, at nightfall descends to among the fifties. In Persia, fearful plagues and pestilences are bred by an atmosphere heated to 125°. At Calcutta and on the Delta of the Ganges, points from which the Asiatic cholera is said to begin its western march, the mercury rises to 120°, while in Central America the same limit is attained.

In the jungles of Afghanistan and in the deserts of Egypt, 110° is the maximum. Strange to say, the same high temperature is reached in some of the interior valleys of California, although the average of the surrounding country is much lower. At Cape Colony, the diamond diggings in Africa, and in some parts of Utah Territory, the midsummer heat is 105°. This is next greatest in Greece, reaching 104°; then comes Arabia, 103°, the arid deserts of that country being much less heated than the vast expanse of Sahara. Now follows a strange anomaly: it will hardly be credited that our blue nosed neighbors in Canada ever experience such a temperature, but it is nevertheless a fact that at Montreal the extreme summer heat is often as high as that of the deserts of Arabia, both being 103°.

Our own State—New York—is not far behind, its summer limit being 102°. Spain, Upper India, Canton, China, the island of Jamaica, and most of our Southern States average 100°. With the exception of New York, 98° is the highest range in the Northern States. The island of Mauritius is next on the list, having a summer temperature of 96°; then come Sierra Leone in Africa and Guiana in South America, both 94°; then Ceylon, 92°. Throughout France, in St. Petersburg (Russia), Denmark, Belgium, Burmah, Shanghai in China, Penang, the Sandwich Islands, Buenos Ayres, and the islands of Bourbon and Trinidad, the average is 90°. That of Nova Scotia and the majority of the Azores islands is 87°. England, Ireland, Sicily, Siam, and Peru in summer are of about the same temperature, not exceeding 85°. Peking in China, Portugal, and Natal Colony in Africa all have mild summers, 80° being the extreme. In Siberia, 77° is the limit. In Western and Southern Australia and the eastern and western parts of Scotland, the temperature does not rise above 75°. In Italy, Venezuela, and Madeira, 73° is the maximum.

The thermometer in Prussia, Victoria Land, and New Zealand rarely rises above 70°; in New South Wales not above 68°, nor in Switzerland and Hungary, above 66°. Colder still are the summers in Bavaria, Sweden, Northern Siberia, Tasmania, and Moscow, in Russia, where 65° is the extreme limit. Norway, Greenland, and Newfoundland have no weather warmer than 60°; 55° is the maximum for Central Scotland, the Orkney Isles, Patagonia, and the Falkland Islands; and finally, amid the ice and snow of the arctic regions, the heat of midsummer is below 50°.

Iceland, however, is colder still. The northern portions of that country virtually have no summer; on its southern shores, which are swept by the Gulf Stream, the temperature sometimes rises to 45°. Last comes Nova Zembla, bleakest and most inhospitable of islands, lying frozen in the Arctic ocean, on the confines of Northern Asia. It can be truly said that in that country there is no summer; for even in these midsummer days, while we suffer under the intense heat, there the mercury fails to rise beyond 34°—two degrees above the freezing point—and this is the very extreme of temperature.

FUNCTION OF POTASSIUM IN SOILS.—According to Nobbé, the presence of potassium in soils is necessary in order to enable the chlorophyll grains of the leaves to form starch, sodium and lithium being unable to replace potassium in this function, the latter indeed being actually injurious. He has also ascertained that the different combinations of potassium vary very much in their value, the chloride being by far the most efficacious.

THE NEW PATENT LAW OF CANADA.

We are indebted to the editor of the New York Daily Witness for an official copy of the new patent law lately passed by the Dominion Parliament, and which goes into effect September 1, 1872.

As this new law provides for the grant of patents and caveats to American citizens, our readers will doubtless be interested to know its general features, and we therefore subjoin an abstract.

The Canadian law is somewhat peculiar. It appears to contain a mixture of the English, American, and Continental systems, together with a few original articles.

Under the English and American laws, the patentee may exercise his own discretion as to the date when he commences the manufacture of his improvements. In consideration of making known his invention, the exclusive right to it for the period of the patent is guaranteed to him, and he may do as he thinks best about introducing it. If he chooses not to work the patent until a late date, or even not at all, it is his own affair. The grant is his and holds good during its allotted term. But at the end of the term, the invention becomes public property, and all persons may then freely enjoy its benefits.

The Canadians have adopted the Continental plan by requiring that the invention shall be actually worked in Canada within two years from the date of the patent on pain of forfeiture of the grant. Provisions of this nature are generally discouraging and inconvenient to inventors. But the proximity of Canada to this country, and the fact that Americans may, during the first year of the patent, make their goods here and take them to Canada, still enjoying protection under the patent, will greatly assist them in establishing the manufacture there within the period required.

Any American invention, even if it has been already patented here, may also be patented in Canada, provided that the American patent is not more than one year old. But if the sale and manufacture of the article has been commenced in Canada before the grant of the Canadian patent, the parties so manufacturing may continue the manufacture after the issue of the patent, without accountability to the patentee. But all other persons will be required to obtain the consent of the patentee before they can sell or manufacture. Our citizens can readily avoid any difficulty on this score by applying for the Canadian patent before the American patent issues.

The Canadian law affords suitable facilities for the sale of part rights in patents, and for the record of assignments. But these privileges appear to be somewhat nullified by another clause, of singular phraseology, which reads as though it was intended to empower the owner of a paltry town right to destroy the validity of the entire patent, should he choose to do so, thus sacrificing the interests of all other owners or workers under the patent, without their knowledge or consent. To effect this nullification of the patent, a part owner has only to import or cause to be imported into Canada a single example of the patented article. This section evidently needs modification.

Another incongruous section is that which punishes the patentee with fine and imprisonment if he fails to stamp the word "Patented" and the year of the patent upon every patented article. The law is specific upon this point; but compliance with it would in many cases be almost impossible. For example, upon needles, hooks and eyes, percussion caps, eyelets, etc., it would be difficult to place a legible stamp. In this country, the law directs that the stamp shall be placed upon the package when it cannot be conveniently affixed to the article.

The Canadian law is also faulty in making the omission of the stamp a penal offence. A patentee's own interests will always lead him to attach the stamp to his goods; and whether the stamp is affixed or not, the public is benefitted, not injured, by the issue of the improved goods. Surely a patentee ought not to be treated as a criminal for the omission of a trivial thing which only concerns himself.

In this country, if the patentee fails to stamp the date of the patent upon his goods, and if any persons not knowing that such goods are patented should imitate them, they cannot be held liable for infringement of the patent. This is a more just and equitable provision than that of Canada.

The Canadian method of deciding interferences is novel. If two persons apply for a patent for the same invention, they are each to choose an arbitrator, and the Commissioner of Patents is to appoint a third. The arbitrators have power to summon witnesses and take evidence, upon which they determine who is the prior inventor, and to him the patent is issued. We shall watch the workings of this peculiar mode of settlement with much interest.

ABSTRACT OF THE NEW CANADIAN PATENT LAW, TAKING EFFECT SEPTEMBER 1ST, 1872.

The Canadian Patent Office is attached to the Department of Agriculture, the Minister whereof and Deputy are, respectively, Commissioner and Deputy Commissioner of Patents. The Governor appoints clerks and assistants. No employee in the Patent Office shall hold an interest in any patent. The Commissioner shall publish an annual report, a list of patents granted, and may also print the specifications and drawings if he thinks best.

Any person having invented any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his invention thereof, and not being in public use or on sale for more than one year previous to his application in Canada, with the consent or allowance of the inventor thereof, may, on a petition to that effect presented to the Commissioner, and in compliance with the other requirements of the

Act, obtain a patent granting to such person an exclusive property therein; but no patent shall issue for an invention having an illicit object in view, nor for any mere scientific principle or abstract theorem.

But an inventor shall not be entitled to a patent for his invention if a patent therefor in any other country shall have been in existence in such country more than twelve months prior to the application for such patent in Canada; and if, during such twelve months, any person shall have commenced to manufacture in Canada the article for which such patent is afterwards obtained, such person shall continue to have the right to manufacture and sell such article, notwithstanding such patent; and under any circumstances, where a foreign patent exists, the Canadian patent shall expire at the earliest date at which any foreign patent for the same invention expires.

The patent may be granted to any person to whom the inventor has assigned or bequeathed the right of obtaining the same, or in default of such assignment or bequest, to the executors or administrators or as signs of the deceased inventor.

The applicant for a patent must make oath (before any Judge in the country where he lives) that he is the inventor, must furnish a full specification of his invention, with drawings in duplicate, together with a neat working model, made on a convenient scale. If the invention is a composition, he must furnish specimens thereof and of the several ingredients.

DURATION AND EXTENSION OF CANADIAN PATENTS.

Patents shall be valid for a period of five, ten, or fifteen years, at the option of the applicant; but at or before the expiration of the said five or ten years, the holder thereof may obtain an extension of the patent for another period of five years, and after those second five years, may again obtain a further extension for another period of five years, not in any case to exceed a total period of fifteen years in all; defective patents may be corrected by reissue or the filing of disclaimers.

The Government of Canada may always use any patented invention, paying to the patentee such sum as the Commissioner may report to be a reasonable compensation for the use thereof.

Patents may be assigned in whole or in part; assignments shall be registered with the Commissioner; the assignment first registered shall be good as against any other assignment of the same patent or interest therein.

INFRINGEMENTS.

An action for the infringement of a patent may be brought before any Court of Record having jurisdiction to the amount of damages asked for, and having its sittings within the Province in which the infringement is said to have taken place, and being, at the same time, of the Courts of such jurisdiction within such Province, the one of which the place of holding is nearest to the place of residence or of business of the defendant; and such Court shall decide the case and determine as to costs. Any Judge thereof, in chambers if the Court be not sitting, may, on the application of the plaintiff or defendant respectively, make such order for an injunction restraining the opposite party from further use, manufacture or sale of the subject matter of the patent, and for his punishment in the event of disobedience to such order, or for inspection or account, and respecting the same and the proceedings in the action, as the Court or Judge may see fit.

MANUFACTURE AND IMPORTATION OF PATENTED IMPROVEMENTS IN CANADA.

Every patent shall be subject to the condition that such patent and all the rights and privileges thereby granted shall cease and determine, and the patent shall be null and void, at the end of two years from the date thereof, unless the patentee, or his assignee or assignees, shall, within that period have commenced, and shall after such commencement continuously carry on, in Canada, the construction or manufacture of the invention or discovery patented, in such manner that any person desiring to use it may obtain it, or cause it to be made for him at a reasonable price, at some manufactory or establishment for making or constructing it, in Canada, and that such patent shall be void if, after the expiration of twelve months from the granting thereof, the patentee or his assignee or assignees for the whole or a part of his interest in the patent, imports or causes to be imported into Canada the invention for which the patent is granted.

Whenever a patentee has been unable to carry on the construction or manufacture of his invention within the two years hereinbefore mentioned, the Commissioner may grant to the patentee a further delay on his adducing proof to the satisfaction of the Commissioner that he was for reasons beyond his control prevented from complying with the same.

CANADIAN PATENT FEES.

The following are the patent fees:

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|--|---------|
| On petition for a patent of 5 years..... | \$20 00 |
| On petition for a patent for 10 years..... | 40 00 |
| On petition for a patent for 15 years..... | 60 00 |
| On petition for extension from 5 to 10 years..... | 20 00 |
| On petition for extension from 10 to 15 years..... | 20 00 |
| On petition for extension from 5 to 15 years..... | 40 00 |
| On lodging a caveat..... | 5 00 |
| On petition to reissue a patent..... | 4 00 |

CAVEATS IN CANADA.

An intending applicant may file in the Patent Office a description of his invention so far, with or without plans, at his own will; and the Commissioner shall cause the said document to be preserved in secrecy, and such document shall be called a caveat. If application shall be made by any other person for a patent for any invention with which such caveat may in any respect interfere, it shall be the duty of the Commissioner forthwith to give notice by mail to the person who has filed such caveat, and such person shall within three months after the day of mailing the notice, if he would avail

himself of the caveat, file his petition and take the other steps necessary on an application for patent.

REJECTIONS.

The Commissioner may object to grant a patent in the following cases:

When he is of opinion that the alleged invention is not patentable in law.

When it appears to him that the invention is already in the possession of the public with the consent or allowance of the inventor.

When it appears to him that there is no novelty in the invention.

When it appears that the invention has been described in a book or other printed publication before the date of the application, or is otherwise in the possession of the public.

When it appears that the invention has already been patented in Canada (or elsewhere, for more than one year), except, however, when the case is one in which the Commissioner has doubts as to whether the patentee or the applicant is the first inventor.

INTERFERENCES.—ARBITRATORS TO DECIDE.

In case of interfering applications for any patent, the same shall be submitted to the arbitration of three skilled persons, one of whom shall be chosen by each of the applicants, and the third person shall be chosen by the Commissioner or his deputy or the person appointed to perform the duty of that office. And the decision or award of such arbitrators, or any two of them, delivered to the Commissioner in writing, and subscribed by them or any two of them, shall be final as far as respects the granting of the patent.

The arbitrators, or any one of them, after having been so sworn, shall have the power of summoning before them any party or witness, and of requiring him to give evidence on oath, orally or in writing (or on solemn affirmation, if the person be entitled to affirm in civil matters), and to produce such documents and things as such arbitrators deem requisite to the full investigation of the matters into which they are appointed to examine, and shall then have the same power to enforce the attendance of such witnesses, and to compel them to give evidence, as is vested in any court of law in civil cases.

The fees for the services of arbitrators shall be a matter of agreement between the arbitrators and the parties.

CANADIAN STAMP PENALTIES.

Every patentee under this act shall stamp or engrave on each patented article, sold or offered for sale by him, the year of the date of patent applying to such article, thus: "Patented 1872," or as the case may be; any such patentee selling or offering for sale any such patented article not so marked shall be liable to the punishment of a fine not to exceed one hundred dollars, and, in default of the payment of such fine, to imprisonment not to exceed two months. The penalty for using the stamp of patented upon an article that has not been patented is a fine not exceeding two hundred dollars and imprisonment not exceeding three months.

The above new Canadian patent law goes into effect Sept. 1st, 1872, when a large number of patents will be applied for by Americans. In fact many persons, desirous of avoiding delay, have already ordered Canadian patents, and their specifications, drawings and models, are now in preparation for deposit in the Government archives at Ottawa. Messrs. Munn & Co. have perfected their arrangements for securing Canadian patents in the most prompt manner, on very reasonable terms, and will be happy to furnish, without charge, further information upon the subject to all who apply. Enquiries may be addressed to them at the SCIENTIFIC AMERICAN Office, 37 Park Row, N. Y.

[Special Correspondence of the Scientific American.]

LETTER FROM PROFESSOR R. H. THURSTON.

PITTSBURGH, Pa., June 25th, 1872,

A visit to the works of Messrs. Sellers. The Giffard Injector. The Baldwin Locomotive Works. Mountain scenery. The Pneumatic Railway Brake. The Water Scoop.

Another of the most interesting among the great manufacturing establishments of Philadelphia is that of Messrs. Sellers & Co., the well known builders of machine tools.

Here about five hundred and fifty men are employed, and, with the ingenious machinery and the effective system adopted in doing work, they produce a larger amount per year than could two thousand men have done ten years ago in even these works, which were then, as now, remarkable as a leading establishment in the business.

The Messrs. Sellers were among the very earliest in the introduction of the system, now almost universal among the best builders, of making all their work precisely to gage, and thus securing the best of workmanship and interchangeable parts. As representing the effectiveness of this modern method of manufacturing, their shops form, as in many other respects, a model establishment. Their machines are as nearly perfect in material and workmanship as it is today possible to make them, and they were probably the first to prove by actual experience that such machinery can find a market in this country at remunerative prices. It must be confessed that there are, however, comparatively few builders who adhere, like this firm, to a determination to do none but the best possible work under all circumstances.

The planing machines and the steam hammers made here are, if a distinction can be made at all, particularly noticeable tools. The method of driving the table of the former, by a spiral pinion working into a rack, is found as effective as it is ingenious. The steam hammer has the weight of its drop in its piston rod, which is made very large, and the system

adopted in guiding it and thus escaping the serious danger which arises in ordinary hammers from a glancing blow, is peculiarly excellent. The valve gear is at once the simplest and most effective that I have seen. Taken as a whole, it is a splendid tool.

THE GIFFARD INJECTOR.

The Giffard steam boiler injector—that wonderful substitute for the steam pump—is another of the most interesting machines made here. I well remember the incredulity with which I first heard, a dozen years ago, of this apparatus in which steam left the boiler, picked up a quantity of water while passing through the instrument, and carried it into the boiler again without the loss of a drop of water or of a particle of steam. I remember that the story appeared still more absurd when it was added that the new pump needed neither valve, plunger, nor any other moving part. It required a visit to the works of the Messrs. Sellers shortly afterward to remove all doubt, and, as a matter of course, the wonder, once seen, became the simplest thing imaginable. The manufacturers have greatly improved the injector since that time, and now there are few railroads in this country on which it is not in regular use.

Every minute spent in this establishment afforded useful information, and I only regretted that I had not a week to spare, instead of but a few hours.

THE BAIRD LOCOMOTIVE WORKS.

An afternoon was spent very pleasantly, and most profitably, in the great Baldwin Locomotive Works of Messrs. Baird & Co. At this establishment, more than twenty-five hundred men are at work, turning out from seven to nine completed locomotive engines every week, and the orders still increase. The proprietors of the works were working men who have, by their industry, intelligence and good management, become the employers of this industrial army, and who have shown what may be done by labor in the acquisition of capital, teaching the same lesson that may be learned in nearly all of the most successful manufacturing establishments here and abroad. All work is here, also, made to gage, and the several parts are "assembled," to make the complete machine, without the expense attending the old process of "cutting and carving" in fitting up. Some of the engines in progress here are for Russian railroads. Like the majority of great industrial establishments, this immense manufactory has been many years in process of growth. It was established half a century ago, and its first locomotive was built in 1830. In 1831, an engine was built here for the Philadelphia and Germantown railroad, which is said to have run a mile in a minute.

Good material, good work, and a plain finish, seem to be the practice here.

There are many other large manufactories and interesting places that attract the attention and afford valuable information to the engineer, and a dozen of them would each afford material for a full column in the SCIENTIFIC AMERICAN; but my time was limited, and I was compelled reluctantly to leave the "City of Brotherly Love," and to pursue my journey westward over that most excellently managed road, the Pennsylvania Railroad.

THE PENNSYLVANIA RAILROAD AND ITS SCENERY.

The excellence of the road bed and the smoothness with which the train ran—sometimes over forty miles an hour—allowed the passengers to enjoy, without annoyance, the beautiful scenery of the Alleghenies. The atmosphere was slightly hazy, but not so much as to interfere seriously with the view of distant mountains and adjacent valleys. At this season, when every mountain side is clothed with the fresh verdure of early summer, and the atmosphere still gives that softness to the distance that is only seen when the heats of summer or the low temperature of winter has not deprived it of its moisture, the scenery is most lovely. This oldest of our mountain chains certainly presents studies for an artist which, if surpassed in grandeur by those of younger ranges, cannot be excelled in quiet beauty.

The run down the western slope of the mountains gave an excellent opportunity of watching the operation of the Westinghouse air brake, which has been many months in use on the Pennsylvania railroad and, we were told, giving perfect satisfaction. We were much pleased with what we saw of it. A continuous brake, not liable to break down just when most needed to "brake up," powerful but controllable in action, and directly under the hand of the engineer—all of which merits are claimed for this—is a much needed invention, and its successful introduction would undoubtedly save many lives, a large amount of property, and perhaps considerable of the expense of running fast trains making frequent stops; and, still further, it would save time to a very important degree. Something of this kind must, sooner or later, be adopted.

At Altoona, a station house roof truss attracted attention by its neatness and simplicity. We noticed also, at two points on the road, troughs of considerable length laid down between the rails and filled with water. The engine was supplied with water, without stopping, by letting down a curved pipe until its mouth entered the water; and, at the high speed at which it ran, it scooped up a quantity while running the length of the trough to replace that previously drawn from the tender. This device has been for some time in use abroad, but the Pennsylvania railroad is probably the first to introduce it in this country. It will probably be found a very valuable device on long lines of road running through express trains.

We finally arrived at Pittsburgh on time, after a quick and pleasant run, and are perfectly willing to agree with those who claim for the Pennsylvania Railroad the credit of having an excellent road bed, good rolling stock, and the best of management.

R. H. T.