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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 INTERNATIONAL RAILWAY CONGRESS.

Fittingly enough, the seventh international railway congress convenes this year at Washington—fittingly because, whatever may be the part played in other countries by the railroad, and far-reaching as its influence has been within their boundaries, it is to the United States we must turn for the more striking evidences of the economic revolution that perfected methods of transportation have wrought. Apart from the mere magnitude of our railway system, we may justly claim that the improvements we have made in permanent way, motive power, and rolling stock have been more marked than those of European roads.

The congress is not to be slightingly regarded as a convention of business men. It is a technical body, whose object it is to promote the engineering progress of railways as well as their economic advancement. Papers of a scientific character are to be read, and the widely-divergent opinions of expert traffic managers, engineers, and car-builders from every country in the world will be heard. In all, four hundred and fifty delegates named by railways of forty-eight countries have crossed the Atlantic and Pacific Oceans to convene at Washington.

Americans will undoubtedly learn much from the discussions that must inevitably arise in such a gathering. The problems faced and solved by the railway men of this country (problems that were well presented in the address of Mr. Stuyvesant Fish before the Congress) are vastly different from those that have confronted Europeans. Here we have been engaged chiefly in providing means of transportation where none previously existed, in threading fertile but unpeopled expanses remote from the sea. In Europe, on the other hand, the railway has been employed, not for the purpose of opening uninhabited regions, but for the more easily attained end of supplementing existing highways and waterways, and of providing a more rapid and efficient means of communication between crowded cities. Perhaps the difference will be more apparent when it is said that European cities were founded centuries ago; that in 1830 the greater part of this country (nearly the entire portion lying westward of the Alleghany Mountains) was an untraveled wilderness; and that seventy years ago there was but one city in America with a population of 100,000, and only twenty-two others with a population of 10,000. On the Atlantic seaboard conditions are fast approaching those of the more densely inhabited European countries. We have now thirty-nine cities of 100,000 inhabitants and over, among them three with more than a million each, besides some four hundred towns with populations of 10,000 to 100,000. Because of this tremendous upbuilding of our communities, we must learn the methods which the European railway builder and manager have found most adequate in dealing with the pressing problem of a rapidly-increasing population. Although the capitalization of our railways is now $63,186 per mile (still far below that of $277,475 of the railways of Great Britain) an increase must certainly be expected, necessitated largely by the laying of additional tracks and the elevation of roads in densely-packed towns. In coping with difficulties of this kind, we must look to Europe for help. And to Europe likewise must we turn for enlightenment on the problem of passenger and freight traffic. Despite the fact that in the middle and western States from seventy to eighty per cent of the revenues have been earned by the carriage of freight, the Atlantic States, according to Mr. Fish, have actually reached the British condition in which passenger preponderates over freight traffic. Only fifty-four per cent of the receipts in the States in question are derived from the carriage of freight.

The foreign delegates will learn how it is that American railways have created both traffic and production, and how the paradoxical situation has arisen which renders it possible for American roads, despite the great cost of labor, to carry freight more cheaply than any railways in the world. Our methods, startlingly different from those followed across the sea, and the products of American inventive genius, untrammeled by years of custom, will no doubt prove revelations to our foreign visitors. If the reports to be submitted at this session, and the discussion of them, are to be marked by the thoroughness of treatment which we have reason to expect of a scientific body, both Americans and Europeans will undoubtedly find that this seventh convocation has been productive of more enlightenment than any of its predecessors.

THE ECONOMICS OF THE MOVING PLATFORM.

We have discussed elsewhere in this issue the motives which have led the Rapid Transit Commission to reserve Thirty-fourth Street for a subway operated with electrical trains, and suggest to the promoters of the moving platform the use of some other less important crosstown thoroughfare. This action of the commission is not to be taken as a reflection upon the practical or commercial value of the moving platform proposition; and, indeed, a study of the mechanical features, as revealed in the engraving which we publish in this issue, and the fact that this system has the indorsement and backing of some of the best-known railroad and electrical experts in this country, afford a strong presumption that wherever the platform is installed it will be so successful as to become an important element in the future transportation facilities of large and crowded cities.

The most striking testimony in favor of the moving platform is that given last November by Mr. Stillwell, the electrical expert of the Interurban Railroad Company, in which he showed the great economic advantage possessed by the moving platform over the electric-car system for city transportation. As the author of the following figures is the electrical engineer for both systems his calculations may be taken as absolutely correct and free from all partiality. It seems then, in the first place, that the moving platform has a great advantage in respect of the dead weight carried per passenger; for whereas in the local Subway service 1,241 pounds of dead weight must be carried for each seat provided, and in the Manhattan six-car local service 790 pounds per seat, in the case of the moving platform the dead weight will amount to only 437 pounds per seat, or one-third of what it is in the case of the Subway. There is, moreover, a large saving of energy resulting from the fact that the moving platform does not stop at stations. In the local service of the Subway over two-thirds of the energy supplied to the cars is dissipated in braking. In other words, if the cars moved at uniform speed and never stopped at stations, it would require only one-third of the power plant to keep the whole system in operation. A comparison of the power required to move the trains and to move the platform shows that the Manhattan Elevated cars require at the power house 30 kilowatts per car, and Subway cars require, at equal speed, about 50 kilowatts per car. In the case of the Subway the energy required is practically 1 kilowatt per seated passenger; that is to say, 10 kilowatts at the power house are required to transport ten seated passengers in the Subway. Estimating the rolling friction of the platform at about 6 pounds per ton, Mr. Stillwell estimates that 10 kilowatts, instead of moving, as in the case of the Subway, ten passengers, would move 260 passengers if they were seated on the moving platform. This great difference of 1 to 26 is due to the small dead load, to the absence of stopping, and to the fact that the rolling friction per ton is very much less.

It has been charged against the moving platform that the speed, 9 miles per hour, is low; but it was shown by Mr. Stillwell and indorsed by Mr. Stuyvesant Fish, that, because of the frequent stops, say on the local elevated or Subway trains, and of the great delay at stations in rush hours due to insufficient means of ingress and egress to and from the cars, the higher speed of the elevated and Subway trains between stops is brought down, if the stops be included, to an average speed of 9.67 miles per hour, which is only a little over one-half mile per hour greater than that of the platform which maintains its 9 miles an hour continuously.

Finally, the capacity of the moving platform is vastly greater than even that of a four-track system when running under its shortest headway. The capacity of the four-track section of the New York Subway, using eight-car express trains at intervals of 2 minutes, and five-car local trains at intervals of 1 minute, is 28,080 seated passengers an hour in one direction; whereas the capacity of the moving platform in one direction is 47,520 seated passengers per hour, an increase of nearly seventy per cent. In the presence of such facts as these, facts of whose reliability, considering the source from which they come, there can be no doubt whatever, it is safe to predict that the moving platform will become an important element in the future rapid transit system of this and other large cities; and it is to be hoped that if the decision of the Rapid Transit Commission against the use of Thirty-fourth Street is final, the sponsors of the moving platform will make use of the opportunity presented for the use of Twenty-third Street or some other important crosstown thoroughfare.

THE STRENGTH OF TIMBER TREATED WITH PRESERVATIVES.

With the increasing use of timber, preserved in one way or another against decay and fire, it is important to determine the effect which the preserving process has upon the strength of the preserved timber. Many engineers believe that creosoted timber is more brittle and less capable of withstanding strains than the same timber before being treated with creosote. This is particularly true with bridge timbers and piling.

Actual tests are necessary to determine what relationship exists between the preservative process and the strength of the timber. Most of the tests hitherto made with preserved timber were made by comparing results of tests on treated sticks with results on untreated sticks. In many instances these turned out in favor of the untreated timber. The reason why such tests are unfair to the preservative is that in the process of preservation two factors enter: (1) The actual process of impregnation with a preserving substance, and (2) the preliminary processes of steam seasoning, in the majority of treating plants in the United States. A piece of timber subsequently treated with creosote may be steamed to such an extent that the timber becomes exceedingly brittle. This, obviously, will be the fault of the steaming and not of the creosote.

Timber preservation divides itself broadly into three stages: First, the preliminary preparation; second, the actual preservative process; and, third, the treatment of timber following preservation. The final strength of the timber may be influenced materially by each of the stages.

The Bureau of Forestry erected an extensive plant on the grounds of the St. Louis Exposition for carrying on a series of investigations of the methods for preserving timber, and of the influence various preservative processes have upon the strength of the timber. These investigations have been organized and outlined by Drs. Von Schrenk and Hatt of the Bureau of Forestry.

This general plan was pursued during the last few months at the timber treating and testing station at St. Louis in accordance with the following outline:

(1) To determine the effect of preliminary processes, such as steaming, on the mechanical properties of the timber.

(2) To determine the effect of preservatives on the strength of timber, eliminating the effect of the preliminary processes.

In order to determine the effect of these factors, the programme was divided into two parts—part 1, the effect of the preliminary process, and part 2, the effect of preservatives.

The effects of the preliminary process were determined only on loblolly pine. Both green and seasoned timber was used in determining the effect of the preservatives. The preservative fluids investigated included only creosote and zinc chlorid.

In making comparative strength tests of treated and untreated timbers, it is necessary to eliminate as far as possible the variations due to the great differences in quality of individual pieces of wood. This was accomplished in this case by using 11-foot timbers cut at the same time from one forest site. In testing the influence of preliminary processes of seasoning, a 3-foot section was cut from one end of each timber and sawed up into test pieces, which furnished a basis of comparison between (1) the results of tests on these "control" pieces, and (2) the results on test pieces taken from the remaining 8-foot section after the latter had been subjected to the various preliminary seasoning processes in the treating cylinder.

In testing the effect of preservatives themselves the entire 11-foot timber was subjected to the preliminary seasoning processes, after which a 3-foot section was cut from the end of each timber. The 3-foot section thus having been subjected to the preliminary seasoning processes formed a basis of comparison with the remaining 8-foot section, which was treated with the preservatives. In this way the separate effects of the preliminary processes and the effects of the preservatives could be isolated and determined.

Because of an apprehension that defects of brittleness of treated timbers might not be evidenced by the ordinary tests under slowly applied loads, provision was made for both static tests and impact tests. The test pieces were subjected to crossbending strain, compression along the grain under both static and impact conditions, and under shearing parallel to the grain and compression at right angles to the grain under static conditions. The data taken include the moisture conditions, specific gravity, and rate of growth. During the treating operations, records were kept of the temperature to which the timbers were subjected at all stages, the amount of water lost or gained, and of the

amount of preservatives absorbed, as indicated by gross weight and subsequent chemical analyses of the test pieces.

Ordinarily the strength tests were made immediately after treatment in the cylinder. In order, however, to determine what weakness might be introduced by changes in the physical condition of the preservatives in the wood through lapse of time, a complete series has been set aside for subsequent operations. An additional set of test pieces has been loaded with different percentages of the strength, as exhibited under the ordinary tests, and this load allowed to act for long periods of time, the deflections being measured from day to day.

While this programme is not sufficiently advanced to allow the drawing of final conclusions, yet the preliminary results are fairly indicative of what may be expected. It is found that the steaming process weakens the resistance of the wood fiber to both static and impact loadings. It may be stated that this diminution of strength is very nearly in direct proportion to the length of time that any given steam pressure is applied. The diminution of strength was found to be 25 per cent after a pressure of 20 pounds was applied for ten hours to green loblolly pine, and 10 per cent when a pressure of 20 pounds was applied for four hours. This diminution of strength increased very rapidly when the pressure rose above 20 pounds, and amounted to about 25 per cent when a pressure of 50 pounds was applied for four hours.

It will be easily seen that when the conditions of time and pressure are made very severe, the conditions prevailing in a pulp mill industry will be approximated. Evidently it is well to avoid when possible the use of these preliminary steaming operations in the wood-preserving industry.

With relation to the effect of preservatives themselves, the latter is distinct from the preliminary process. It may be said that the treatment with zinc chlorid does not seem to further reduce the strength of timber beyond the effect of the steaming process. This might have been expected when it is considered that the strength of the zinc chlorid solution ordinarily used does not exceed 2½ per cent. The strength of timber that has been treated with the 2½ per cent solution of zinc chlorid after having been steamed four hours at 20 pounds pressure was the same as that of timber which had been steamed without the subsequent application of zinc chlorid. The same statement may be made of timber treated with an 8½ per cent solution of zinc chlorid. It may be that subsequently the crystallization of the zinc chlorid will weaken the wood fiber. This remains to be determined.

The effect of the creosote appears to be the same as that of an equal amount of water in weakening the fiber. That is to say, the strength of creosoted timber is that of green timber. The difference is that while green timber gains strength upon seasoning, the creosote oil remains in the wood, and it appears from analysis of a pile 35 years old, that the oil remains in a liquid condition. Consequently, comparison between seasoned timber and creosoted timber will always result to the disadvantage of the latter as far as its strength is concerned. In the case of creosoted wood, it also remains to determine what changes in the wood fiber take place through lapse of time in the presence of creosote oil.

It is expected that a bulletin will be issued upon the results of these investigations when the tests are completed. This bulletin will also contain the results of the investigations to determine the best methods of preserving wood so that the maximum impregnation may be obtained with the least expenditure of oil per cubic foot of timber.

A VISIT TO THE INTERIOR OF THE CRATER OF MONT PELÉ AND A PARTIAL ASCENT OF THE NEW "DOME."

As far as is known to Mr. E. O. Hovey, the Abbé J. Yvon (of Martinique) and Franz Beaufrand, manager of the Habitation Chalvet, are the first persons to have made a descent into the crater of Mont Pelé since the present series of eruptions began in May, 1902, and to have made a complete circuit of the "Dome" of the mountain. Their visit was made on October 24, 1904, and is described at length under the caption "Dans le Cratère du Mont Pelé" in La Martinique for November 23, 1904, and we can do no better perhaps than to publish Mr. Hovey's free translation of the Abbé's account of the trip.

"The day was perfectly calm, and we were at the summit of the mountain about two o'clock in the afternoon, accompanied by the faithful Latour, the domestic of the presbyter of Basse Pointe, who acted as our porter. The summit of the mountain was covered by a rather thick cloud, but this cleared away about three o'clock and we prepared at once for the descent into the crater.

"We directed our steps toward Morne Lacroix, and from there followed the lip of the crater toward the north and west, trying to find a place where the wall was neither too high nor too difficult, because we had brought with us a rope only 12 to 15 meters long. I was expecting to go almost as far as the talus of blocks of the Rivière Blanche, but at about 200 meters north of Morne Lacroix my companion, much more intrepid than I, stepped on the edge of the crater, examined the ground, and said with admirable assurance, 'Here is where we must go down.' Without giving me time to offer the least objection, he put the knotted end of the rope in the hands of Latour and myself, threw the rest of the rope into the crater, and began to descend.

"When he disappeared below the brink, a dreadful uncertainty came over me; who knows whether our little rope of '*maho*' will be strong enough, and then, after the first 12 or 15 meters of depth, there remains another 50 meters to descend, and from above that appeared almost impossible. I was in all sorts of doubts, when the cord vibrated vigorously. What had happened? An accident, perhaps! Happily, nothing had happened. Franz had simply shaken the cord and continued to descend, scrambling along the wall.

" 'You can come,' he cried to me. 'It is very easy.' I must confess that I was not entirely convinced. Still it was my turn; it would not do to hesitate, though a complication had arisen. At the top of the crater, there would remain Latour alone to support me. Would he be strong enough for the task? As a measure of precaution, I made him lie down and stick his feet into two holes which we had dug in the ground, so that he might anchor himself and hold onto the rope to advantage. It was a good idea, and Latour did his part well.

"We were not, however, at the bottom of the crater, and there was opportunity for performing gymnastics. At first, it was impossible to stand erect. It was necessary to sit upon the rocks projecting from the wall, and climb from one to another by the use of both hands and feet. This was hard work, and one left on the rocks the skin of his hands, the bottom of his trousers, and the leather of his shoes. At last, after a quarter of hour of this exercise, we arrived at the bottom of the valley at the base of the Dome, which fills completely the avenue of communication with the interior of the earth.

"It is an error to suppose that there exists, in the bottom of the crater of Mont Pelé, a hole from which lava and gases have come out. At present, there is there a tremendous cork of andesite which is called 'The Dome,' and which must have as its dimensions a diameter of 800 meters at its base and an altitude of from 350 to 400 meters. On all sides of the dome there are fumaroles, some of which (especially toward the north) throw out a reddish smoke, others (on the south and southeast sides of the dome) discharge whitish vapors, and still others, along the bottom of the crater near the base of Morne Lacroix in particular, are surrounded with a carpet of sulphur covering the earth over a surface of several square meters. The temperature of the last-named fumaroles must be relatively low, as sulphur melts at 110 deg. C. to 120 deg. C.

"We went to one of these fumaroles at about 50 meters from the base of Morne Lacroix, and there we noticed several rocks covered with little crystals of sulphur and likewise a deposit 5 to 15 millimeters thick of a kind of salt which had a taste resembling potash. At this fumarole the ground was not excessively hot, about 65 deg. to 70 deg. C., but it was very wet, closely resembling the heavy sands and muds which one encounters at the seashore. The sulphur emanations produce considerable discomfort in breathing, but they are incapable of asphyxiating a person in a short time. In the smoke itself, one can breathe three or four times without being obliged to leave. Still, we did not stay long at this spot, as it is extremely dangerous to remain there on account of the avalanches from the dome. These avalanches no longer occur only on the side of the Rivière Blanche; they are more numerous on the east side, and tend to fill the crater near Morne Lacroix. At present the avalanches are very frequent, and probably not two minutes passes without one occurring at some point or other on the side toward Morne Lacroix.

"When these avalanches are large, they cause in their descent from the dome small clouds of very fine white dust, which can easily be confounded at a distance with smoke. This dust is carried away by the wind, and deposited upon different parts of the mountain. During the night from October 20 to 21 [1904] when one of the two great teeth which surmounted the dome was destroyed, dust fell as far away as the hamlet of Ajoupa-Bouillon.

"But let us return to our excursion. We were 50 meters from the base of Morne Lacroix, near the sulphur fumarole, and were just quitting it, when a rather thick cloud invaded the crater, and prevented our seeing more than 15 meters. We could no longer perceive the courses of the avalanches. It was very disquieting, and each moment we thought that they were coming upon us. Latour, perched above upon the rim of the crater itself, was extremely anxious for several minutes. The cloud concealed us from his sight, the avalanches seemed very strong, and he questioned whether we were not already killed. He began to call to us at the top of his voice, and we hallooed in response, demanding of him what he wanted. The reply came that 'the evil spirits of the mountain were abroad, and that we ought to come out of the crater with all speed.' It was simply an exhortation for prudence, and Latour was right. The avalanches becoming more and more frequent and nearer and nearer, it was indeed wise to leave the spot where we were. Even when the avalanches seemed to take a direction far enough away from us, we were in fear because the immense blocks which descended from the summit sometimes struck and broke off in their course other blocks which were already hardened and seemed secure. Furthermore, there were on all sides discharges of stones like the explosions of shells, accompanied with rather troublesome clouds of hot dust.

"On our way back to our point of descent, we discovered at about 150 meters from the base of Morne Lacroix, toward the north, a fumarole the temperature of which attained not less than 150 deg. C. at the orifice. At two meters above the ground one could not bear the hand for a moment in the vapors.

"We vainly tried to climb the lip of the crater at the spot where we had descended. The rope of *maho* was much too slender, and the good Latour was by no means strong enough to support alone the jerks of the ascent. It was necessary then to go as far as the talus of fragments of the Rivière Blanche, to find a place to get out. The walk was not agreeable. In fact, the nearer one came to this point, the larger were the blocks which had been thrown down by the avalanches. Advance could be made only by leaping from one rock to another, and the rocks had broken edges as sharp as a cutlass, so that it would have been easy to break an arm or a leg, if one were awkward enough to lose his footing.

"We were especially impressed with the peculiar aspect of certain of these blocks. On one side they presented a highly-polished surface which reminded one of the former great 'Spine,' which surmounted the crater during part of a year and which was called 'The Cone.' Between these blocks, in the very bottom of the crater and at the point of junction of the dome with the crater wall, we found a species of moss growing, a fact which indicated that no hot cloud had passed over that particular spot for a long time.

"At last we were at the famous talus of fragments, a little above and at the north of the rocky cliff which is called the Petit Bonhomme. It is a spectacular and at the same time grand and terrible scene that this immense, whitish slope presents, beginning at the summit of the dome and extending to the sea. The slope toward the east [west?] is at first extremely rapid, then diminishes gradually as one approaches the site of St. Pierre. If my eyes did not deceive me, the dome has from this spot nearly 500 meters of altitude and the same diameter of base.

"Needless to say, we did not prolong our stay unnecessarily beside this famous talus of fragments. For my part, I recalled that all the destructive clouds of 1902 and 1903 had issued from this spot, and at the thought my blood almost ran cold. Accordingly, I begged my comrade to hasten and to climb with me the seven or eight meters which it was necessary to surmount to attain the rim of the crater. In a few seconds this was done, and I was expecting to welcome at last the termination of my adventures, when looking toward the side opposite to the crater, I saw that we were obliged to walk along a narrow ridge, balancing ourselves between two precipices, the crater on one side and the abysses of Prêcheur on the other.

"I assure you that I was almost discouraged, and I had for the moment the idea of retreating and descending by the bed of the Rivière Blanche and of sleeping at Carbet. Fortunately, my 'mentor' was present. With unequaled audacity and agility, he ventured upon the dangerous ridge and invited me to follow. Thus was I obliged, through pride, to pass where he had passed, and I followed him.

"For about 100 meters it was death or balancing at every step, and we performed feats of agility, of strength, and of daring and prodigies of skill that I shall never forget. Arrived at the plateau on the summit of the mountain, we cast a last look over the route which we had traversed. A great sigh of relief escaped us, and we rendered thanks to God for having been able to accomplish without accident an excursion which might well have cost our lives.

"This tale may perhaps pass for romance in the eyes of some skeptics. As proof of its truth, we have planted a flag at the bottom of the crater, at about 50 meters north from the base of Morne Lacroix. We have likewise brought here with us some rocks covered with sulphur and other salts which we do not recognize, stones which we found within the crater, and finally we have a photograph taken in the bottom of the crater at the north of the dome."