

TRACK AND STREAM.

News from Sources of Information Presumably Correct Regarding Traffic by Land and Water Yesterday—A Number of Distinguished Arrivals, Together with Departures Notably Prominent—The Libbie Conger and Grand Pacific in Port—Arrangements by River Craft for Convoyance of the Public to the Red Rock Camp Meeting.

Locating a New Line of Railroad. We understand that a company have their engineers engaged in locating a new line of railroad from Grand Marais on north shore of Lake Superior to a point thirty miles north to strike the great iron and silver range of hills. It is this company's intention to further extend the road west along the said range to Vermilion lake with a branch road running to Arthur's Landing, and thereby fully develop the iron and silver mines in that section.

Rail Notes. But one hundred emigrants arrived in the city by trains from the East yesterday. The special car of the Rock Island road was taken east by the 4:05 train yesterday afternoon.

The Souix City express due in St. Paul at 11:55 yesterday morning, was forty-five minutes late. G. E. Lambert, general agent of the Hoosac Tunnel route, Chicago, went to Winnipeg last night.

The shipments of live stock East from Montana via the Northern Pacific, will commence next week. There was an immense demand for accident insurance tickets yesterday and the dealers did a land office business.

One hundred and fifty engineers in attendance upon the convention here, were denied at the union depot yesterday. J. B. Flagg, district passenger agent of the Chicago, Milwaukee & St. Paul road at La Crosse, was in the city yesterday.

George C. Howe, from Pennsylvania en route to the Dohrly farm, left for Castleton by the Manitoba road last night. T. S. Rattle, contracting agent of the Chicago & Northwestern, returned from Winnipeg yesterday and proceeded East last evening.

The Northwestern Traffic association has issued a ukase declining to receive and transport fruit or vegetables save in car load lots, straight or mixed. Nels Clifton, traveling agent for the Northern Pacific, arrived from Ishpeming, Michigan, yesterday, accompanied by a party of settlers for Dakota.

G. T. Clarke, assistant general traffic manager of the Omaha line, returned yesterday from a trip through Montana, Washington Territory and Dakota. The first ticket from Helena, Montana, to St. Paul on the Northern Pacific, has been sold to the First National bank of Helena, for a consideration of \$150.

H. Colman passed through the city from Chicago yesterday en route to northern Dakota, where he will locate lands for a colony of young men from the Lake City. J. F. Barnard, general superintendent of the Kansas City, St. Jo & Council Bluffs railway, arrived from Minneapolis by special yesterday and left last night for St. Joseph, Mo.

F. B. Ross, western passenger agent of the Houston & Texas Central railway, St. Louis, was a welcome caller at the office of Assistant General Passenger Agent Davis, of the Manitoba line, yesterday. On and after to-day, rates on lumber by the Omaha line from Pratts, Drummonds, Fosters, Sidney or Mason to St. Paul, Minneapolis and Minnesota Transfer will be 9 1/2 cents per cwt. by car load.

Two sleepers on the Milwaukee & St. Paul line having unexpectedly been disabled, their absence was yesterday supplied with a similar number obtained through the courtesy of the Manitoba line. N. J. Footner, superintendent of the Northern Pacific express, has prepared a special tariff of rates, to govern the transportation of commercial baggage by express, at rates that will be favorable to shippers.

A relic of a former generation is included in the archives of General Freight Agent Hannaford's office of the Northern Pacific, the same being a tariff of rates for freight on the Lake Superior, Mississippi & Minnesota division of the Northern Pacific railroad, taking effect May 22, 1873. The rates are made upon shipments from St. Paul, Minneapolis, St. Anthony, Stillwater and Duluth to Moorhead and intervening points, and are considerably higher than those which now obtain. The tariff is comprehended in six pages, and besides setting forth the chief object of its publication, communicates the fact that Joseph Skelton is the general Eastern agent at No. 263 Broadway, New York; W. H. Winger is superintendent of the Lake Superior and Mississippi division at St. Paul; J. H. Sullivan superintendent of the Minnesota division at Brainerd; C. W. Mead, general manager, and W. S. Alexander, at present general traffic manager of the Manitoba line, was general freight agent, both of St. Paul.

The River. The river is on a stand opposite St. Paul with seven feet four inches depth of water in the channel. The General Barnard, in the government service, takes an excursion party of engineers to Stillwater to-morrow. The G. B. Knapp came up yesterday from the three mills with low for Walker, Judd & Veazie. She departed for Stillwater last night with a cargo of car axles for the car works at that place.

To-morrow the Longfellow, of the St. Paul Packet company, will ply between this city and Red Rock, running on schedule time, and accompanied by a barge. On Sundays the service will be increased by the G. B. Knapp.

The Libbie Conger, of the Diamond Jig line, arrived at 10 o'clock yesterday morning with 150 tons of freight including twenty head of stock and thirty passengers. She backed out at 3:30 p. m., carrying seventy tons of freight and twenty-five passengers.

The Grand Pacific will run between St. Paul and Red Rock during the camp meeting services. On week days she will leave here at 7 and 10:30 p. m. On Sunday she will run thither every two hours, commencing at 8 a. m. and continuing until 8 p. m.

The Grand Pacific, of the Saints line, reached here yesterday with the cargo of the Keokuk, aggregating 250 tons of freight, fifteen head of stock and seventy-five passengers. The Minneapolis will be here on time to leave for St. Louis on Saturday at noon.

Grand Truck East Trains. MONTEAL, June 21.—The Grand Truck railway commences Monday next to run fast trains. The run between Montreal and Toronto will be made in ten hours; between Chicago and Boston, forty hours. It will

THE ENGINEERS.

CONCLUDING SESSION OF THE NATIONAL CONVENTION.

Invitations Received—Water Currents—St. Anthony Water Power—Accurate Measurements—The Question of a Standard of Time—The Naswhit Pile Driver.

Just before the opening of yesterday's session of the convention of American Society of Civil Engineers, in the representatives' hall at the capitol, Mr. Benjamin Bronson, the pioneer civil engineer of Minnesota, exhibited to many of the members an improved plumb bob invented by himself.

When the convention was called to order, Secretary Bogart made his usual announcements of invitations received and arrangements made. He stated that the canvass made Wednesday evening showed that most of the members will stay over Saturday to take the excursion to Stillwater and announced that the government steamer, Gen. Barnard, will be in readiness to take the party from St. Paul at 10 a. m. Saturday. Invitations received were from the general manager of the Canadian Pacific railway, for excursions over that road and from the general manager of the Wisconsin Central railway for a visit to Ashland and return to Chicago by way of that road. The announcements for the day included lunch at the union depot, immediately after adjournment and a railway trip to Fort Snelling, Minnehaha and the Short line bridge.

Supreme Court. The supreme court sat in chambers yesterday on the matter of the arraignment of the Page Sixsmith lumber company, the full bench being present with the exception of Judge Mitchell, the process served being a writ of certiorari. Time was granted the parties to arrange their defenses in brief and submit the same to the court.

Probate Court. [Before Judge McGroarty.] Insanity of Mary Sanders and Thos. Milner, Sr.; informations filed; examination to-day at 2 o'clock p. m.

Couldn't Play as Well as He Thought. A man named Myer, hailing from St. Cloud, arrived at the Green Tree hotel Wednesday, accompanied by a grip sack, some money, and a confidence in his ability to sweep the board at "old sledge," which, in the light of subsequent events, passes ordinary understanding. Having established himself at the hotel, thrown a couple of bowls and checkers, he began an engagement of boasting which for a brief season was played to crowded audiences with brilliant results. He related his prowess in the capacity of a sport, and expatiated at length upon his ability to "thump a jack," in language as profound with scientific import as the sermons of Jo Cook. This sort of pastime was indulged by his hearers for a time, but coming to the knowledge of a couple of the boys, they determined to test his mettle, and did that very thing so effectively that he was persuaded to take a hand in a game of "high, low, jack and the game," which cost him a total of \$55. He accepted an invitation to visit a Robert street saloon and wanted to make a deal of \$25 a pot, but was induced to play smaller stakes. Before the deal got round to him a half dozen times he was resolved into a bankrupt individual. Upon returning to the hotel he told of his misfortune to the landlady, and enlisted the services of that gentleman to secure the revivin or "troll." Acting upon the suggestion that greeted his recital, he invoked the services of the police, and through the agency of that service, procured the return of his money. Hereafter when he visits St. Paul, he will refrain from a narration of his achievements over the cloth of green, and will steer clear of the road that taketh hold on a game of chance.

Water Currents. The first paper presented was by F. P. Stearns, of Boston, on current meter observations and the cause of the maximum velocity of flowing water being below the surface. On account of its length, at suggestion of the author, this paper was read by its title with the understanding that it would be separately presented with its accompanying illustrations to those members who are especially interested in hydraulic engineering.

St. Anthony Water Power. The second paper, by J. P. Frizell, of St. Louis, on the water power of St. Anthony Falls, was read by the author. He states that the total fall of the river between Minneapolis and St. Paul is 110 to 115 feet. The greatest fall in use is about 50 feet, and the average fall in use for power at the Falls of St. Anthony is about 37 1/2 feet. The river above the falls falls 40 to 50 feet in 2000 feet, which is about the average rate of fall in about thirty inches per annum. The present available water power at the falls he estimates at about 10,000 horse power, day and night, and this he concludes could be doubled by proper economy and scientific appliances, while a further increase might be made by storage reservoirs. In estimating the power at this point applicable to industrial works he would include the sawdust, equivalent to 20,000 tons of coal annually, which is burned in the river. The reservoirs the government is building near the sources of the river being for use in the season of navigation would be of no benefit to the water power in winter, when the need of water at the falls is greatest. Indeed, the best use of the reservoir, to benefit navigation, would be in retaining the winter drainage. Whether the owners of the water power have acquired conflicting rights will stand against the government's power over the same ways may hereafter be a question for the court to decide. The northern limit of the Trenton limestone through which the falls have worn their way is about 800 yards above the present brink of the falls, where the limestone is about fifteen feet thick, having been cut down fifteen to eighteen feet by the water. Below this limestone is the St. Peter sandstone, 140 to 150 feet thick, overlying a rock as hard as granite. The sandstone of the sandstone is fifteen to twenty feet below the limestone and it creates extreme difficulty in tunneling to utilize the whole power of the falls; but otherwise the sandstone facilitates the construction of tunnels. The water power is owned by two companies—the Minneapolis Mill company owning the west side, and the St. Anthony Falls Water Power company owning the east side. These companies chartered in 1857, built dams on the falls, for handling and sawing logs, and reduced the width of the flow from 1,200 to 500 feet. This produced an alarming increase in the retrocession of the falls, which, under natural conditions, was four or five feet per year, but in 1856 to 1868 was increased to twenty feet, and the direct fall of water, which in 1865 was sixteen and a half feet, was increased so that it is now thirty-one feet. In the fall of 1868 a tunnel was begun for a raceway for mills on Nicollet and the water under the dam was passed by the water under the limestone and the works for the preservation of the falls, which was described in the papers read Tuesday and Wednesday, which have saved the falls from immediate danger of disappearance. But the danger is not wholly over. The abrasive action of the current running over the apron has cut holes below the falls forty or fifty feet deep. These were filled with stones, which washed out; then the government engineer advised the crisis has been described for breaking the force of the water. The paper proceeds to describe the grants of water power made by the companies and the damage and waste in their present use. There has been little aid from civil engineers in application of this great water power. Common sense engineering, as it is sometimes called, has left here a legacy of trouble for the future. But its makeshifts will no longer serve, for no extension of the use of the power is possible without better engineering work, which will be embarrassed by the accumulated results of the makeshifts for twenty years past. In view of the difficulties in the way of having adopted rightful rules and plans for utilizing the power, Mr. Frizell recommends that the government withdraw wholly from control of the falls, that the two water power companies be united under one management, which will at once restore the whole natural channel over the falls, and that means be taken to protect the power from waste. Then, he says, the water power of St. Anthony Falls will be the largest on the continent.

Accurate Measurements. A conversational discussion followed as to the measurement of water in lesses, the majority opinion and practice appearing to be in favor of the theoretical horse power as measured by the cubic feet of water passing her minute per one foot head. In the course of the conversation it was mentioned that at Minneapolis formerly the power was estimated by measuring the square of the canal leading to the wheel, which rather generous idea of measurement brought a smile all around the convention.

Accurate Measurements. The next paper, read by Capt. O. E. Michaelis, on Accurate Measurements, was also presented by the author, who, on account of the lack of time, merely referred to the diagrams and plates which will illustrate it when published. He explained how his attention was drawn to the need of a reliable instrument for accurate measurements and the suggestions which led him

THE ENGINEERS.

CONCLUDING SESSION OF THE NATIONAL CONVENTION.

Invitations Received—Water Currents—St. Anthony Water Power—Accurate Measurements—The Question of a Standard of Time—The Naswhit Pile Driver.

Just before the opening of yesterday's session of the convention of American Society of Civil Engineers, in the representatives' hall at the capitol, Mr. Benjamin Bronson, the pioneer civil engineer of Minnesota, exhibited to many of the members an improved plumb bob invented by himself.

When the convention was called to order, Secretary Bogart made his usual announcements of invitations received and arrangements made. He stated that the canvass made Wednesday evening showed that most of the members will stay over Saturday to take the excursion to Stillwater and announced that the government steamer, Gen. Barnard, will be in readiness to take the party from St. Paul at 10 a. m. Saturday. Invitations received were from the general manager of the Canadian Pacific railway, for excursions over that road and from the general manager of the Wisconsin Central railway for a visit to Ashland and return to Chicago by way of that road. The announcements for the day included lunch at the union depot, immediately after adjournment and a railway trip to Fort Snelling, Minnehaha and the Short line bridge.

Supreme Court. The supreme court sat in chambers yesterday on the matter of the arraignment of the Page Sixsmith lumber company, the full bench being present with the exception of Judge Mitchell, the process served being a writ of certiorari. Time was granted the parties to arrange their defenses in brief and submit the same to the court.

Probate Court. [Before Judge McGroarty.] Insanity of Mary Sanders and Thos. Milner, Sr.; informations filed; examination to-day at 2 o'clock p. m.

Couldn't Play as Well as He Thought. A man named Myer, hailing from St. Cloud, arrived at the Green Tree hotel Wednesday, accompanied by a grip sack, some money, and a confidence in his ability to sweep the board at "old sledge," which, in the light of subsequent events, passes ordinary understanding. Having established himself at the hotel, thrown a couple of bowls and checkers, he began an engagement of boasting which for a brief season was played to crowded audiences with brilliant results. He related his prowess in the capacity of a sport, and expatiated at length upon his ability to "thump a jack," in language as profound with scientific import as the sermons of Jo Cook. This sort of pastime was indulged by his hearers for a time, but coming to the knowledge of a couple of the boys, they determined to test his mettle, and did that very thing so effectively that he was persuaded to take a hand in a game of "high, low, jack and the game," which cost him a total of \$55. He accepted an invitation to visit a Robert street saloon and wanted to make a deal of \$25 a pot, but was induced to play smaller stakes. Before the deal got round to him a half dozen times he was resolved into a bankrupt individual. Upon returning to the hotel he told of his misfortune to the landlady, and enlisted the services of that gentleman to secure the revivin or "troll." Acting upon the suggestion that greeted his recital, he invoked the services of the police, and through the agency of that service, procured the return of his money. Hereafter when he visits St. Paul, he will refrain from a narration of his achievements over the cloth of green, and will steer clear of the road that taketh hold on a game of chance.

Water Currents. The first paper presented was by F. P. Stearns, of Boston, on current meter observations and the cause of the maximum velocity of flowing water being below the surface. On account of its length, at suggestion of the author, this paper was read by its title with the understanding that it would be separately presented with its accompanying illustrations to those members who are especially interested in hydraulic engineering.

St. Anthony Water Power. The second paper, by J. P. Frizell, of St. Louis, on the water power of St. Anthony Falls, was read by the author. He states that the total fall of the river between Minneapolis and St. Paul is 110 to 115 feet. The greatest fall in use is about 50 feet, and the average fall in use for power at the Falls of St. Anthony is about 37 1/2 feet. The river above the falls falls 40 to 50 feet in 2000 feet, which is about the average rate of fall in about thirty inches per annum. The present available water power at the falls he estimates at about 10,000 horse power, day and night, and this he concludes could be doubled by proper economy and scientific appliances, while a further increase might be made by storage reservoirs. In estimating the power at this point applicable to industrial works he would include the sawdust, equivalent to 20,000 tons of coal annually, which is burned in the river. The reservoirs the government is building near the sources of the river being for use in the season of navigation would be of no benefit to the water power in winter, when the need of water at the falls is greatest. Indeed, the best use of the reservoir, to benefit navigation, would be in retaining the winter drainage. Whether the owners of the water power have acquired conflicting rights will stand against the government's power over the same ways may hereafter be a question for the court to decide. The northern limit of the Trenton limestone through which the falls have worn their way is about 800 yards above the present brink of the falls, where the limestone is about fifteen feet thick, having been cut down fifteen to eighteen feet by the water. Below this limestone is the St. Peter sandstone, 140 to 150 feet thick, overlying a rock as hard as granite. The sandstone of the sandstone is fifteen to twenty feet below the limestone and it creates extreme difficulty in tunneling to utilize the whole power of the falls; but otherwise the sandstone facilitates the construction of tunnels. The water power is owned by two companies—the Minneapolis Mill company owning the west side, and the St. Anthony Falls Water Power company owning the east side. These companies chartered in 1857, built dams on the falls, for handling and sawing logs, and reduced the width of the flow from 1,200 to 500 feet. This produced an alarming increase in the retrocession of the falls, which, under natural conditions, was four or five feet per year, but in 1856 to 1868 was increased to twenty feet, and the direct fall of water, which in 1865 was sixteen and a half feet, was increased so that it is now thirty-one feet. In the fall of 1868 a tunnel was begun for a raceway for mills on Nicollet and the water under the dam was passed by the water under the limestone and the works for the preservation of the falls, which was described in the papers read Tuesday and Wednesday, which have saved the falls from immediate danger of disappearance. But the danger is not wholly over. The abrasive action of the current running over the apron has cut holes below the falls forty or fifty feet deep. These were filled with stones, which washed out; then the government engineer advised the crisis has been described for breaking the force of the water. The paper proceeds to describe the grants of water power made by the companies and the damage and waste in their present use. There has been little aid from civil engineers in application of this great water power. Common sense engineering, as it is sometimes called, has left here a legacy of trouble for the future. But its makeshifts will no longer serve, for no extension of the use of the power is possible without better engineering work, which will be embarrassed by the accumulated results of the makeshifts for twenty years past. In view of the difficulties in the way of having adopted rightful rules and plans for utilizing the power, Mr. Frizell recommends that the government withdraw wholly from control of the falls, that the two water power companies be united under one management, which will at once restore the whole natural channel over the falls, and that means be taken to protect the power from waste. Then, he says, the water power of St. Anthony Falls will be the largest on the continent.

Accurate Measurements. A conversational discussion followed as to the measurement of water in lesses, the majority opinion and practice appearing to be in favor of the theoretical horse power as measured by the cubic feet of water passing her minute per one foot head. In the course of the conversation it was mentioned that at Minneapolis formerly the power was estimated by measuring the square of the canal leading to the wheel, which rather generous idea of measurement brought a smile all around the convention.

Accurate Measurements. The next paper, read by Capt. O. E. Michaelis, on Accurate Measurements, was also presented by the author, who, on account of the lack of time, merely referred to the diagrams and plates which will illustrate it when published. He explained how his attention was drawn to the need of a reliable instrument for accurate measurements and the suggestions which led him

THE ENGINEERS.

CONCLUDING SESSION OF THE NATIONAL CONVENTION.

Invitations Received—Water Currents—St. Anthony Water Power—Accurate Measurements—The Question of a Standard of Time—The Naswhit Pile Driver.

Just before the opening of yesterday's session of the convention of American Society of Civil Engineers, in the representatives' hall at the capitol, Mr. Benjamin Bronson, the pioneer civil engineer of Minnesota, exhibited to many of the members an improved plumb bob invented by himself.

When the convention was called to order, Secretary Bogart made his usual announcements of invitations received and arrangements made. He stated that the canvass made Wednesday evening showed that most of the members will stay over Saturday to take the excursion to Stillwater and announced that the government steamer, Gen. Barnard, will be in readiness to take the party from St. Paul at 10 a. m. Saturday. Invitations received were from the general manager of the Canadian Pacific railway, for excursions over that road and from the general manager of the Wisconsin Central railway for a visit to Ashland and return to Chicago by way of that road. The announcements for the day included lunch at the union depot, immediately after adjournment and a railway trip to Fort Snelling, Minnehaha and the Short line bridge.

Supreme Court. The supreme court sat in chambers yesterday on the matter of the arraignment of the Page Sixsmith lumber company, the full bench being present with the exception of Judge Mitchell, the process served being a writ of certiorari. Time was granted the parties to arrange their defenses in brief and submit the same to the court.

Probate Court. [Before Judge McGroarty.] Insanity of Mary Sanders and Thos. Milner, Sr.; informations filed; examination to-day at 2 o'clock p. m.

Couldn't Play as Well as He Thought. A man named Myer, hailing from St. Cloud, arrived at the Green Tree hotel Wednesday, accompanied by a grip sack, some money, and a confidence in his ability to sweep the board at "old sledge," which, in the light of subsequent events, passes ordinary understanding. Having established himself at the hotel, thrown a couple of bowls and checkers, he began an engagement of boasting which for a brief season was played to crowded audiences with brilliant results. He related his prowess in the capacity of a sport, and expatiated at length upon his ability to "thump a jack," in language as profound with scientific import as the sermons of Jo Cook. This sort of pastime was indulged by his hearers for a time, but coming to the knowledge of a couple of the boys, they determined to test his mettle, and did that very thing so effectively that he was persuaded to take a hand in a game of "high, low, jack and the game," which cost him a total of \$55. He accepted an invitation to visit a Robert street saloon and wanted to make a deal of \$25 a pot, but was induced to play smaller stakes. Before the deal got round to him a half dozen times he was resolved into a bankrupt individual. Upon returning to the hotel he told of his misfortune to the landlady, and enlisted the services of that gentleman to secure the revivin or "troll." Acting upon the suggestion that greeted his recital, he invoked the services of the police, and through the agency of that service, procured the return of his money. Hereafter when he visits St. Paul, he will refrain from a narration of his achievements over the cloth of green, and will steer clear of the road that taketh hold on a game of chance.

Water Currents. The first paper presented was by F. P. Stearns, of Boston, on current meter observations and the cause of the maximum velocity of flowing water being below the surface. On account of its length, at suggestion of the author, this paper was read by its title with the understanding that it would be separately presented with its accompanying illustrations to those members who are especially interested in hydraulic engineering.

St. Anthony Water Power. The second paper, by J. P. Frizell, of St. Louis, on the water power of St. Anthony Falls, was read by the author. He states that the total fall of the river between Minneapolis and St. Paul is 110 to 115 feet. The greatest fall in use is about 50 feet, and the average fall in use for power at the Falls of St. Anthony is about 37 1/2 feet. The river above the falls falls 40 to 50 feet in 2000 feet, which is about the average rate of fall in about thirty inches per annum. The present available water power at the falls he estimates at about 10,000 horse power, day and night, and this he concludes could be doubled by proper economy and scientific appliances, while a further increase might be made by storage reservoirs. In estimating the power at this point applicable to industrial works he would include the sawdust, equivalent to 20,000 tons of coal annually, which is burned in the river. The reservoirs the government is building near the sources of the river being for use in the season of navigation would be of no benefit to the water power in winter, when the need of water at the falls is greatest. Indeed, the best use of the reservoir, to benefit navigation, would be in retaining the winter drainage. Whether the owners of the water power have acquired conflicting rights will stand against the government's power over the same ways may hereafter be a question for the court to decide. The northern limit of the Trenton limestone through which the falls have worn their way is about 800 yards above the present brink of the falls, where the limestone is about fifteen feet thick, having been cut down fifteen to eighteen feet by the water. Below this limestone is the St. Peter sandstone, 140 to 150 feet thick, overlying a rock as hard as granite. The sandstone of the sandstone is fifteen to twenty feet below the limestone and it creates extreme difficulty in tunneling to utilize the whole power of the falls; but otherwise the sandstone facilitates the construction of tunnels. The water power is owned by two companies—the Minneapolis Mill company owning the west side, and the St. Anthony Falls Water Power company owning the east side. These companies chartered in 1857, built dams on the falls, for handling and sawing logs, and reduced the width of the flow from 1,200 to 500 feet. This produced an alarming increase in the retrocession of the falls, which, under natural conditions, was four or five feet per year, but in 1856 to 1868 was increased to twenty feet, and the direct fall of water, which in 1865 was sixteen and a half feet, was increased so that it is now thirty-one feet. In the fall of 1868 a tunnel was begun for a raceway for mills on Nicollet and the water under the dam was passed by the water under the limestone and the works for the preservation of the falls, which was described in the papers read Tuesday and Wednesday, which have saved the falls from immediate danger of disappearance. But the danger is not wholly over. The abrasive action of the current running over the apron has cut holes below the falls forty or fifty feet deep. These were filled with stones, which washed out; then the government engineer advised the crisis has been described for breaking the force of the water. The paper proceeds to describe the grants of water power made by the companies and the damage and waste in their present use. There has been little aid from civil engineers in application of this great water power. Common sense engineering, as it is sometimes called, has left here a legacy of trouble for the future. But its makeshifts will no longer serve, for no extension of the use of the power is possible without better engineering work, which will be embarrassed by the accumulated results of the makeshifts for twenty years past. In view of the difficulties in the way of having adopted rightful rules and plans for utilizing the power, Mr. Frizell recommends that the government withdraw wholly from control of the falls, that the two water power companies be united under one management, which will at once restore the whole natural channel over the falls, and that means be taken to protect the power from waste. Then, he says, the water power of St. Anthony Falls will be the largest on the continent.

Accurate Measurements. A conversational discussion followed as to the measurement of water in lesses, the majority opinion and practice appearing to be in favor of the theoretical horse power as measured by the cubic feet of water passing her minute per one foot head. In the course of the conversation it was mentioned that at Minneapolis formerly the power was estimated by measuring the square of the canal leading to the wheel, which rather generous idea of measurement brought a smile all around the convention.

Accurate Measurements. The next paper, read by Capt. O. E. Michaelis, on Accurate Measurements, was also presented by the author, who, on account of the lack of time, merely referred to the diagrams and plates which will illustrate it when published. He explained how his attention was drawn to the need of a reliable instrument for accurate measurements and the suggestions which led him

THE ENGINEERS.

CONCLUDING SESSION OF THE NATIONAL CONVENTION.

Invitations Received—Water Currents—St. Anthony Water Power—Accurate Measurements—The Question of a Standard of Time—The Naswhit Pile Driver.

Just before the opening of yesterday's session of the convention of American Society of Civil Engineers, in the representatives' hall at the capitol, Mr. Benjamin Bronson, the pioneer civil engineer of Minnesota, exhibited to many of the members an improved plumb bob invented by himself.

When the convention was called to order, Secretary Bogart made his usual announcements of invitations received and arrangements made. He stated that the canvass made Wednesday evening showed that most of the members will stay over Saturday to take the excursion to Stillwater and announced that the government steamer, Gen. Barnard, will be in readiness to take the party from St. Paul at 10 a. m. Saturday. Invitations received were from the general manager of the Canadian Pacific railway, for excursions over that road and from the general manager of the Wisconsin Central railway for a visit to Ashland and return to Chicago by way of that road. The announcements for the day included lunch at the union depot, immediately after adjournment and a railway trip to Fort Snelling, Minnehaha and the Short line bridge.

Supreme Court. The supreme court sat in chambers yesterday on the matter of the arraignment of the Page Sixsmith lumber company, the full bench being present with the exception of Judge Mitchell, the process served being a writ of certiorari. Time was granted the parties to arrange their defenses in brief and submit the same to the court.

Probate Court. [Before Judge McGroarty.] Insanity of Mary Sanders and Thos. Milner, Sr.; informations filed; examination to-day at 2 o'clock p. m.

Couldn't Play as Well as He Thought. A man named Myer, hailing from St. Cloud, arrived at the Green Tree hotel Wednesday, accompanied by a grip sack, some money, and a confidence in his ability to sweep the board at "old sledge," which, in the light of subsequent events, passes ordinary understanding. Having established himself at the hotel, thrown a couple of bowls and checkers, he began an engagement of boasting which for a brief season was played to crowded audiences with brilliant results. He related his prowess in the capacity of a sport, and expatiated at length upon his ability to "thump a jack," in language as profound with scientific import as the sermons of Jo Cook. This sort of pastime was indulged by his hearers for a time, but coming to the knowledge of a couple of the boys, they determined to test his mettle, and did that very thing so effectively that he was persuaded to take a hand in a game of "high, low, jack and the game," which cost him a total of \$55. He accepted an invitation to visit a Robert street saloon and wanted to make a deal of \$25 a pot, but was induced to play smaller stakes. Before the deal got round to him a half dozen times he was resolved into a bankrupt individual. Upon returning to the hotel he told of his misfortune to the landlady, and enlisted the services of that gentleman to secure the revivin or "troll." Acting upon the suggestion that greeted his recital, he invoked the services of the police, and through the agency of that service, procured the return of his money. Hereafter when he visits St. Paul, he will refrain from a narration of his achievements over the cloth of green, and will steer clear of the road that taketh hold on a game of chance.

Water Currents. The first paper presented was by F. P. Stearns, of Boston, on current meter observations and the cause of the maximum velocity of flowing water being below the surface. On account of its length, at suggestion of the author, this paper was read by its title with the understanding that it would be separately presented with its accompanying illustrations to those members who are especially interested in hydraulic engineering.

St. Anthony Water Power. The second paper, by J. P. Frizell, of St. Louis, on the water power of St. Anthony Falls, was read by the author. He states that the total fall of the river between Minneapolis and St. Paul is 110 to 115 feet. The greatest fall in use is about 50 feet, and the average fall in use for power at the Falls of St. Anthony is about 37 1/2 feet. The river above the falls falls 40 to 50 feet in 2000 feet, which is about the average rate of fall in about thirty inches per annum. The present available water power at the falls he estimates at about 10,000 horse power, day and night, and this he concludes could be doubled by proper economy and scientific appliances, while a further increase might be made by storage reservoirs. In estimating the power at this point applicable to industrial works he would include the sawdust, equivalent to 20,000 tons of coal annually, which is burned in the river. The reservoirs the government is building near the sources of the river being for use in the season of navigation would be of no benefit to the water power in winter, when the need of water at the falls is greatest. Indeed, the best use of the reservoir, to benefit navigation, would be in retaining the winter drainage. Whether the owners of the water power have acquired conflicting rights will stand against the government's power over the same ways may hereafter be a question for the court to decide. The northern limit of the Trenton limestone through which the falls have worn their way is about 800 yards above the present brink of the falls, where the limestone is about fifteen feet thick, having been cut down fifteen to eighteen feet by the water. Below this limestone is the St. Peter sandstone, 140 to 150 feet thick, overlying a rock as hard as granite. The sandstone of the sandstone is fifteen to twenty feet below the limestone and it creates extreme difficulty in tunneling to utilize the whole power of the falls; but otherwise the sandstone facilitates the construction of tunnels. The water power is owned by two companies—the Minneapolis Mill company owning the west side, and the St. Anthony Falls Water Power company owning the east side. These companies chartered in 1857, built dams on the falls, for handling and sawing logs, and reduced the width of the flow from 1,200 to 500 feet. This produced an alarming increase in the retrocession of the falls, which, under natural conditions, was four or five feet per year, but in 1856 to 1868 was increased to twenty feet, and the direct fall of water, which in 1865 was sixteen and a half feet, was increased so that it is now thirty-one feet. In the fall of 1868 a tunnel was begun for a raceway for mills on Nicollet and the water under the dam was passed by the water under the limestone and the works for the preservation of the falls, which was described in the papers read Tuesday and Wednesday, which have saved the falls from immediate danger of disappearance. But the danger is not wholly over. The abrasive action of the current running over the apron has cut holes below the falls forty or fifty feet deep. These were filled with stones, which washed out; then the government engineer advised the crisis has been described for breaking the force of the water. The paper proceeds to describe the grants of water power made by the companies and the damage and waste in their present use. There has been little aid from civil engineers in application of this great water power. Common sense engineering, as it is sometimes called, has left here a legacy of trouble for the future. But its makeshifts will no longer serve, for no extension of the use of the power is possible without better engineering work, which will be embarrassed by the accumulated results of the makeshifts for twenty years past. In view of the difficulties in the way of having adopted rightful rules and plans for utilizing the power, Mr. Frizell recommends that the government withdraw wholly from control of the falls, that the two water power companies be united under one management, which will at once restore the whole natural channel over the falls, and that means be taken to protect the power from waste. Then, he says, the water power of St. Anthony Falls will be the largest on the continent.

Accurate Measurements. A conversational discussion followed as to the measurement of water in lesses, the majority opinion and practice appearing to be in favor of the theoretical horse power as measured by the cubic feet of water passing her minute per one foot head. In the course of the conversation it was mentioned that at Minneapolis formerly the power was estimated by measuring the square of the canal leading to the wheel, which rather generous idea of measurement brought a smile all around the convention.

Accurate Measurements. The next paper, read by Capt. O. E. Michaelis, on Accurate Measurements, was also presented by the author, who, on account of the lack of time, merely referred to the diagrams and plates which will illustrate it when published. He explained how his attention was drawn to the need of a reliable instrument for accurate measurements and the suggestions which led him

THE ENGINEERS.

CONCLUDING SESSION OF THE NATIONAL CONVENTION.

Invitations Received—Water Currents—St. Anthony Water Power—Accurate Measurements—The Question of a Standard of Time—The Naswhit Pile Driver.

Just before the opening of yesterday's session of the convention of American Society of Civil Engineers, in the representatives' hall at the capitol, Mr. Benjamin Bronson, the pioneer civil engineer of Minnesota, exhibited to many of the members an improved plumb bob invented by himself.

When the convention was called to order, Secretary Bogart made his usual announcements of invitations received and arrangements made. He stated that the canvass made Wednesday evening showed that most of the members will stay over Saturday to take the excursion to Stillwater and announced that the government steamer, Gen. Barnard, will be in readiness to take the party from St. Paul at 10 a. m. Saturday. Invitations received were from the general manager of the Canadian Pacific railway, for excursions over that road and from the general manager of the Wisconsin Central railway for a visit to Ashland and return to Chicago by way of that road. The announcements for the day included lunch at the union depot, immediately after adjournment and a railway trip to Fort Snelling, Minnehaha and the Short line bridge.

Supreme Court. The supreme court sat in chambers yesterday on the matter of the arraignment of the Page Sixsmith lumber company, the full bench being present with the exception of Judge Mitchell, the process served being a writ of certiorari. Time was granted the parties to arrange their defenses in brief and submit the same to the court.

Probate Court. [Before Judge McGroarty.] Insanity of Mary Sanders and Thos. Milner, Sr.; informations filed; examination to-day at 2 o'clock p. m.

Couldn't Play as Well as He Thought. A man named Myer, hailing from St. Cloud, arrived at the Green Tree hotel Wednesday, accompanied by a grip sack, some money, and a confidence in his ability to sweep the board at "old sledge," which, in the light of subsequent events, passes ordinary understanding. Having established himself at the hotel, thrown a couple of bowls and checkers, he began an engagement of boasting which for a brief season was played to crowded audiences with brilliant results. He related his prowess in the capacity of a sport, and expatiated at length upon his ability to "thump a jack," in language as profound with scientific import as the sermons of Jo Cook. This sort of pastime was indulged by his hearers for a time, but coming to the knowledge of a couple of the boys, they determined to test his mettle, and did that very thing so effectively that he was persuaded to take a hand in a game of "high, low, jack and the game," which cost him a total of \$55. He accepted an invitation to visit a Robert street saloon and wanted to make a deal of \$25 a pot, but was induced to play smaller stakes. Before the deal got round to him a half dozen times he was resolved into a bankrupt individual. Upon returning to the hotel he told of his misfortune to the landlady, and enlisted the services of that gentleman to secure the revivin or