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(Illustrated articles are marked with an asterisk.)

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For the Week Ending October 31, 1891.

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PROGRESS OF IRRIGATION.

On September 15, a notable gathering of notable men took place at Salt Lake City, being the first meeting of the Irrigation Congress. The membership comprised many eminent persons, chiefly from States west of the Mississippi, their object in meeting being the interchange of views and discussion of the best methods of redeeming to useful purposes the millions of acres of arid lands which now lie drear and abandoned in various sections of the great West.

Of the success of irrigation wherever it has been properly carried out, all the speakers bore enthusiastic testimony. The driest lands are made to blossom as the rose, and wherever the blessed water spreads there is soon found a contented, happy and prosperous people.

The place selected for the assembly was especially appropriate, Salt Lake City being the first and perhaps the noblest example to be found in the country of the wonderful results gained by irrigation. Here in the midst of verdure and the music of running water in every street the congress began its sessions. Among the speakers was Wilford Woodruff, President of the Mormons. He said:

"Fifty-one years ago the 24th of last July, I entered this valley with 143 emigrants, or in other words, pioneers. We were led by President Young. This country that we arrived upon was called the Great American Desert, and certainly as far as we could see it did not deviate from that in the least. We found a barren desert here. There was no mark of the Anglo-Saxon race, no mark of the white man—everything was barren, dry, and desert.

"We pitched our camp a little distance to the southeast from here about 11 o'clock in the day. We had a desire to try the soil to know what it could produce. Of course all this company—nearly the whole of us—were born and raised in the New England States, Vermont, Maine, Massachusetts, Connecticut—had no experience in irrigation.

"You gentlemen come here to-day; you see the city, you go through the country. Here are a thousand miles, I might say, through these mountains filled with cities, towns, villages, gardens, and orchards, and the produce of the earth that sustains the people. Without this water, this irrigation for which you have met here to-day, this country would be as barren as we found it."

He was followed by President Cannon, one of the early settlers, who said: "I took my first lessons in irrigation when a boy, in 1848. I have had but comparatively little practical experience in the business since then, but it has become very familiar to us. We have not had much time to theorize upon it, but practically we have carried out this system throughout the length and breadth of our Territory.

"There is one point that I think of great importance, and I think it worthy the consideration of this body. We have refrained, I was going to say, religiously, from forming great corporations to take possession of the water; we have not been taxed for our water in Utah, but settlements have combined together and by their own labor have taken the water out and have contributed by their labor in forming dams and digging ditches to obtain the necessary supply for their acreage. I think this is a very important feature in this Territory. We have not had to pay for our water; poor men could take land and obtain water by their own labor.

"Another feature of our system has been that we have had small holdings. When we settled this city, the lots were divided out; each lot was an acre and a quarter. The lots were laid out in such a way that the front of one lot faced the side of another. It was designed to be a city of villas and to have plenty of room. You see the breadth of our streets and the amplitude of our lots; this was the original design. Then, next to our city, a tier of five-acre lots was laid out, then a tier of ten-acre lots, then a tier of twenty-acre lots. There were no lots laid out of a larger extent than twenty acres. That there might be perfect fairness, we cast lots for these. The mechanics were expected to want five acres; those who were in better condition it was thought would require ten acres, while the farmers received twenty acres.

"My distinguished friend, President Woodruff, lived and sustained his family upon twenty acres of land, and I may say to his credit there is no better farmer in this country than he has been. He has been noted throughout all our community for his indefatigable industry.

"We have kept from monopolizing the land and been willing to have it distributed in small holdings, so that every man might have a foothold. I believe that I do not overstate the truth when I say that in no part of the United States is there a population containing so many people living on their own lands and owning their own houses as in Utah Territory.

"I believe also in the artesian system. I have been a believer in it always and for a great many years. I believe that we can get large supplies of water from subterranean sources. I have experimented with this, and I believe I have the honor of being the first person to own an artesian well in this valley or in all our valleys. I have sunk a good many wells, and I find them very excellent. I have one now with which I water several acres—a well four hundred feet deep. I think when we get experienced well drivers in this country, we shall find that we can bring large supplies of water to the surface that will aid us in cultivating our lands; for all that we have in this country is water.

"There is no part of Nevada which you travel through, no country, which looked any worse than this valley did nor any more unlikely to be productive than this valley did when it was first settled; but industry and skill have changed this valley into fruitful fields and orchards and there is no limit."

Many most excellent speeches followed, but our limited space prevents quotations therefrom. A great variety of resolutions were offered, some containing financial projects for building dams and canals, others for the acquisition or leasing of arid lands, others calling upon the general government to issue millions of dollars' worth of bonds and bore the arid earths for wells, and make the lands fit for people to live in. It was stated there are six hundred and fifty millions of acres of arid lands still held by the general government, of which five hundred millions of acres require to be irrigated by artesian wells, no other source of water supply being available. When all the speeches had been made and all the resolutions discussed the following reasonable platform was agreed upon and the congress adjourned:

Resolved, That this congress is in favor of granting in trust to the States and Territories needful of irrigation, all lands now a part of the public domain within such States and Territories, excepting mineral lands, for the purpose of developing irrigation to render the lands now arid fertile and capable of supporting a population.

THE INTRODUCTION OF REINDEER INTO ALASKA.

A very interesting experiment in the introduction of reindeer into this country has been commenced. Dr. Sheldon Jackson, the government agent of education in Alaska, has begun the work. During the past season he imported sixteen reindeer from Siberia, which cost about $160. Next year he proposes to establish a herd of reindeer in the neighborhood of Fort Clarence and expects to begin with 100 animals. Siberia has vast numbers of these animals, and in its climate and vegetation resembles greatly Alaska, so that there is no reason to doubt that they will thrive on the eastern side of Behring Straits. The reindeer is useful as a draught animal for sleds, as well as for its milk, its meat, its skin. From the econimical point of view the experiment is of the highest degree of interest and it is gratifying to see that the Federal Government recognizes the importance of the work.

Capt. M. A. Healy, of the revenue cutter Bear has reported to the Treasury Department, emphasizing the proposition as the most important question now before the Territory of Alaska. The recent destruction of seals and sea lions has certainly had its effect upon the food supply question of the country and islands in the neighborhood of Behring Straits, and any distress brought about by the destruction of seals may be alleviated by the introduction of the reindeer. In Iceland, where the reindeer was first introduced in 1870, it has increased greatly in number but is said to have relapsed into wildness and is now of little use to the inhabitants. It is to be hoped that better fortune will attend their introduction into Alaska, and that they will be treated as domestic animals, and not share the fate of the buffalo.

DESERTIONS FROM THE NEW NAVY.

The difficulty experienced by the officers of the Bennington to prevent wholesale desertions among the crew while the ship is in port is not by any means a new one in our fleet. The new ships, with perhaps the single exception of the Chicago, seem to be lacking in accommodations for their crews. While in the old-time frigate or line-of-battle ship a crew of 700, or even more, could be comfortably housed, with free circulation of air, it is impossible in the present type of steam vessels to find hammock room for one-third that number without huddling. Close quarters and foul air is now become the regular billet, and a single cruise is enough to dampen the ardor of the most enthusiastic sailor man.

The commander of the Bennington declares that, if the Brooklyn police do not increase their efforts to capture his deserters, he will not have men enough man his engines, not to mention his deck. He ought to complain against the designer of the ship rather than against the police, for, under a strict interpretation of the navy regulations, it is doubtful if, the men's case being properly set forth, they should be punished for desertion. The regulations provide with painstaking particularity that a ship's crew must be properly housed and fed.

So strict are these rules that it is made a part of the duty of the officer of the deck to taste the men's food before it is served, thus making sure of its wholesome-

ness, and the duty of the surgeon to examine the men's quarters and report in writing to the captain. In the old days the men did their four hours duty aloft and then retired to the comforts of the roomy gun deck with gun ports open on every hand. Now they haul at tackle and falls or toil before the furnaces and retire into a rat hole under the forward hatches.

In port, with windlasses set and a draught of air below, life in the men's quarters is bearable, but on such a cruise as the Bennington is about to set out upon, the inconvenience and discomforts are intolerable. Those who have inspected the quarters on the new ships will not think it strange that the men desert in gangs at the rumor of a long cruise.

It has been suggested that the designers of these ships be made to take a cruise in them, thus getting practical evidence of their defects as to ventilation and living room.

They have spent their time devising engines and batteries; now they should try and devise a means of keeping men enough aboard to work them.

POSITION OF THE PLANETS IN NOVEMBER.

JUPITER

is evening star. He is still the leader of the starry hosts, but, before the month closes, a powerful rival enters modestly into the field to contest his supremacy. It is plain to every observing eye that our giant brother is departing. He no longer appears above the eastern hills soon after sunset, as he did when in opposition, but is high up toward the meridian when his light pierces the sky depths. He makes his transit at 7 o'clock in the middle of the month, sets soon after midnight, and holds his court in the western sky instead of the eastern. This brilliant planet is passing through the small groups of Aquarius. His retrograde or western movement ends on the 3d, when he becomes stationary, and then moves eastward, or in direct motion, until the end of the year.

The moon is in conjunction with Jupiter the day after the first quarter, on the 10th, at 1 h. 50 m. P. M., being 4° 9′ south. Moon and planet will make a pleasing picture when it is dark enough for them to be visible on the evening of the 10th.

The right ascension of Jupiter on the 1st is 22 h. 41 m., his declination is 9° 48′ south, his diameter is 42″.8, and he is in the constellation Aquarius.

Jupiter sets on the 1st at 1 h. 19 m. A. M. On the 30th, he sets at 11 h. 31 m. P. M.

NEPTUNE

is morning star until the 29th, and then becomes evening star. He is in opposition with the sun on the 29th at 10 h. P. M. This far-away planet then makes his nearest approach, for the sun, the earth and Neptune are in line, with the earth in the middle. Observers endowed with exceptional visual powers can see Neptune with the aid of an opera glass; but the number of such observers is small. He is, however, a beautiful object in a good telescope, appearing as a tiny disk of a delicate blue tint. He will be found a short distance north west of Aldebaran.

The right ascension of Neptune on the 1st is 4 h. 28 m., his declination is 20° 6′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune rises on the first at 6 h. 25 m. P. M. On the 30th, he sets at 6 h. 56 m. A. M.

VENUS

is evening star. She sets an hour later than the sun at the close of the month, and keen-eyed observers may possibly find this charming star lingering in the glow of twilight, and giving a foretaste of the brilliancy of her appearance when farther away from the sun. She must be looked for 2½° south of the sunset point on the 30th.

The one-day-old moon makes a close conjunction with Venus on the 2d, at 2 h. 32 m. P. M., being 13′ north, but planet and crescent are too near the sun to be visible.

The right ascension of Venus on the 1st is 15 h. 7 m., her declination is 17° 38′ south, her diameter is 10″.2, and she is in the constellation Libra.

Venus sets on the 1st at 5 h. 22 m. P. M. On the 30th, she sets at 5 h. 32 m. P. M.

SATURN

is morning star. He is favorably situated for observation, rising nearly four hours before the sun at the commencement of the month, and six hours before the sun at its close. He rises about 2 o'clock on the middle of the month, and may then be seen coming up in the east, a little farther east and 12° farther south than the bright star Dembola.

The moon, two days after the last quarter, is in conjunction with Saturn on the 25th at 8 h. 50 m. A. M., being 2° 40′ north.

The right ascension of Saturn on the 1st is 11 h. 49 m., his declination is 3° 20′ north, his diameter is 15″.4, and he is in the constellation Virgo.

Saturn rises on the 1st at 2 h. 49 m. A. M. On the 30th, he rises at 1 h. 6 m. A. M.

MARS

is morning star. He rises at the close of the month about three hours and a half before the sun, and may be dimly discerned as a small ruddy star, 4° east and a little north of Spica. An opera glass will certainly bring him into the field.

The moon is in conjunction with Mars on the 27th at 11 h. 52 m. A. M., being 2° 3′ north.

The right ascension of Mars on the 1st is 12 h. 26 m., his declination is 1° 38′ south, his diameter is 4″.2, and he is in the constellation Virgo.

Mars rises on the 1st at 3 h. 45 m. A. M. On the 30th, he rises at 3 h. 24 m. A. M.

MERCURY

is evening star. There is nothing noteworthy in his course as he makes his way toward his greatest eastern elongation, setting later and increasing in diameter as the distance widens between him and the sun.

The right ascension of Mercury on the 1st is 14 h. 44 m., his declination is 16° 2′ south, his diameter is 4″.6, and he is in the constellation Libra.

Mercury sets on the 1st at 4 h. 52 m. P. M. On the 30th, he sets at 5 h. 24 m. P. M.

URANUS

is morning star. He is too near the sun to be visible. His right ascension on the 1st is 14 h. 1 m., his declination is 11° 47′ south, his diameter is 3″.4, and he is in the constellation Virgo.

Uranus rises on the 1st at 5 h. 52 m. A. M. On the 30th, he rises at 4 h. 6 m. A. M.

Mars, Saturn, and Uranus are morning stars at the close of the month. Mercury, Venus, Jupiter, and Neptune are evening stars.

For an Eiffel Tower at Chicago.

It is reported that arrangements have been about completed by which a tower higher than the Eiffel construction will be erected in close proximity to the World's Fair grounds at Chicago, to be finished by February 1, 1893. The designs contemplate a tower 440 feet in diameter at the base and 1,120 feet high, having three circular platforms or landings, the first 200 feet from the ground and 250 feet in diameter, the second 400 feet from the ground and 150 feet in diameter, and the third 1,000 feet from the ground and 60 feet in diameter. Above the latter will be signal service offices and departments for scientific investigation. Around the outside of the first landing will be a grand colonnade fifteen feet wide, and the numerous restaurants, kiosks and booths to be provided are designed to accommodate many thousands. An offer in writing has been made by a large iron firm to put up the tower in the time stated for the sum of $1,500,000, which is less than the cost of the Eiffel tower, the lower price being made because standard and merchantable sizes of steel can be used in the American construction. The promoters of this enterprise are said to embrace capitalists of Chicago, St. Louis, Cincinnati, Pittsburg and other places.

World's Fair Items.

—The foundation work of the Administration Building is all finished, and the material for the iron work of the edifice itself is being received on the grounds. This building is constructed of material to last but two years, and it will cost $650,000, although it covers a space of but 250 feet square. It is designed to represent in itself one of the noblest achievements of modern architecture, and will occupy the most commanding position on the exposition grounds. The building consists of four pavilions, 84 feet square, one at each of the four angles of the square of the plan, and connected by a great central dome, 120 feet in diameter and 260 feet high.

—Aside from the cost of the great exhibition buildings, which will not be far from $7,000,000, the following are among the sums which have been, or will be, spent in preparation of the exposition grounds: Grading and filling, $450,000; landscape gardening, $323,500; viaducts and bridges, $125,000; piers, $70,000; waterway improvements, $225,000; railways, $500,000; steam plant, $800,000; electric lighting, $1,500,000, statuary, $100,000; vases, lamps, etc., $50,000; lake front adornment, $200,000; water supply and sewerage, $600,000; other expenses, $1,000,000; total, $5,943,500.

—The great extent of the fair can hardly at present be measured, but some idea of its immensity may be gathered from the fact that the space thus far set apart for exposition purposes is three times the area of the Paris exposition grounds, or about the size of Central Park, New York, between 700 and 800 acres.

The Fahrenheit Thermometer.

In a note published in the Proceedings of the Cambridge Philosophical Society, Mr. A. Gamgee investigates the principle according to which Fahrenheit constructed his thermometric scale.

The author remarks, in the first place, that although Fanrenheit's thermometer has for a long time been employed in England and America, and that its use therein is general, technical books have not, up to the present, given any accurate information as to the principles that presided in the establishment of its scale. In his treatise upon heat, Mr. Tait has, it is true, given the opinion, afterward admitted by several scientists, that Fahrenheit divided his scale from 32° to 212° into 180° in order to imitate the division of the arc of a quarter circle. This theory is based upon an incorrect supposition, viz., that, before Fahrenheit, Newton had proposed as the basis of the scale the freezing and boiling points of water, the interval between these two points being divided into equal degrees.

Mr. Gamgee thinks that, in his *Scala graduum calories*, Newton advances nothing that Mr. Tait attributes to him, and, besides that, Fahrenheit fixed the basis of his scale and constructed a large number of thermometers long before Amantons discovered the fact (confirmed and pointed out precisely by Fahrenheit) that the boiling point of water remains constant under a constant pressure.

According to Mr. Gamgee, the first thermometers constructed by Fahrenheit were alcohol ones, and were closed and provided with a scale whose two points were fixed. The zero of the scale, indicating the lowest temperature that it was possible to reach, was obtained by plunging the bulb of the instrument into a mixture of ice and salt, while the highest point of heat was determined by placing the thermometer under the armpit or in the mouth of a healthy man. The interval between these two points was divided into twenty-four parts, each of which corresponded to well marked differences of temperature, and each of these divisions was divided into four. In his later alcohol and mercury thermometers, the twenty-four principal divisions were suppressed, and were replaced by a scale of 96°, from ice to human heat. The 32° of these thermometers was obtained by plunging the bulb in melting ice.

Fahrenheit was led to construct mercurial thermometers on making some researches upon the boiling point of water. With mercury it became necessary to increase the scale above to 600°.

The figure 212, the degree of heat necessary for the boiling of water at a mean atmospheric pressure, was a result that *experiment alone* brought out.

Upon the whole, Mr. Gamgee thinks that Fahrenheit took, as the basis of his thermometric scale, the duodecimal scale, which he was accustomed to use.—*Revue Scientifique.*

Remarkable Test of a Torpedo Boat.

An experiment was made at Plymouth, Eng., October 22, with a boom to check the rushes of torpedo boats. The boom was thickly studded with formidable steel spikes, together with a seven inch steel hawser stretched taut overhead as a balk.

Torpedo Lieutenant Sturdee, who had disapproved the plan, offered to prove the correctness of his assertion that the device would not afford the protection desired. He guaranteed that he would either jump or force the boom, and he finally obtained permission to make the attempt.

A swift torpedo boat was loaned the lieutenant for the experiment. Upon this he built a massive arched superstructure extending from bow to stern, intended to raise and support the overhanging hawser. Four seamen volunteered to accempany the daring lieutenant.

The lives of all concerned were specially insured for the benefit of their families by orders of the Admiralty, whose experts believed that the attempt of Lieutenant Sturdee meant almost certain death. The importance of the experiment as a means of making an actual test of the availability of this means of defense alone justified the risk in the eyes of the officials.

The boom having been adjusted across the mouth of the harbor, the torpedo boat started on its hazardous mission. The start was made half a mile away from the boom, and a high rate of speed was attained as the obstruction was neared. At the last moment the Lieutenant and his men rushed below and fastened down the hatches. An instant later the boat, running at a speed of nineteen knots, struck the boom.

The concussion was terrific, and all the occupants of the craft were thrown so violently against the sides of the boat that they were painfully bruised. It seemed for a moment as though, the expectations of Lieut. Sturdee would be realized and the boat force its way through the boom. She jumped nearly clear, but before she got through, the hawser caught her and pressed her against the big spikes of the boom, which held her like a vise and tore her bottom badly. The boat at once began to make water.

The seamen worked at her some time before she could be got free. Then they started for the beach, but the boat foundered before reaching it, the crew being taken off by the boats from shore. There was much excitement among the spectators, and, though Lieut. Sturdee's views had been disproved, his bravery and that of his companions was highly praised.

THE great bulk of alcohol made in this country is produced at Peoria, Ill. It is made from corn. The price paid there for corn was, until lately, 37½ cents per bushel, but it has now risen to 70 cents.