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Table listing contents of the supplement including AERONAUTICS, ANTHROPOLOGY, ARBORICULTURE, CIVIL ENGINEERING, COLUMBIAN EXPOSITION, COSMOLOGY, EDUCATION, ELECTRICITY, GEOLOGY, METALLURGY, MINING ENGINEERING, NAVAL ENGINEERING, PHOTOGRAPHY, PHYSICS, SOCIAL SCIENCE, TECHNOLOGY.

PROGRESS OF RAILWAYS IN THE UNITED STATES.

From Poor's Manual for 1893 we learn that the total length of track existing at the close of 1892 was 175,223 miles, for which the aggregate liabilities of the various companies was, in round numbers, eleven thousand and eighty-nine millions of dollars (\$11,089,000,000). The aggregate amount paid for operating expenses for 1892 was eight hundred and forty-six millions six hundred and thirty-three thousand dollars (\$846,633,000). The total traffic receipts were one thousand two hundred and five millions of dollars (\$1,205,272,023), and the net earnings \$358,638,520. The number of passengers carried was 575,769,678, and of freight 749,331,860 tons.

Out of this nearly two hundred and thirty-three millions of dollars were paid for interest, and a little over eighty-three millions went for dividends.

The aggregate rolling stock at the close of 1892 was as follows: Number of locomotives, 35,754; passenger cars, 26,321; baggage cars, 7,900; freight cars, 1,168,867.

ARMOUR INSTITUTE.

Armour Institute, the great technical school of Chicago, will open its doors on September 14 to 400 students, who have been enrolled by the president, Dr. Frank W. Gunsalus. The equipment in mechanical and electrical engineering is very fine, and some idea of the shops may be obtained when it is stated that a 150 horse power engine can be built in the machine shop. The equipment of electrical testing instruments is very remarkable, nearly all of them being purchased from the exhibits of the Fair, the buying being done by Mr. Stine, who is a juror of awards in the electrical department. The four years' course in electrical engineering at the institute will be very thorough, and will aim to prepare students to hold responsible positions in electrical companies, for the commercial side of the science is to be treated in a more practical manner than in the other institutions which have courses in electrical engineering. The Armour Institute's electrical department is divided into four laboratories. The main laboratory will be fitted up with fifteen dynamos and motors as well as all the leading makes of transformers, and regular station voltmeters, ammeters, meters, etc. The second section will be known as the galvanometer laboratory and will contain much of the high class apparatus purchased at the Fair. The institute will offer to electric light stations and colleges a testing bureau for standardizing resistances. The third laboratory is on the ground floor and all the apparatus will be mounted on stone piers to prevent vibration. The fourth laboratory will be devoted to the measurement of the candle power of lamps and will be fitted with the best photometric apparatus obtainable. The Armour Institute has every chance of having a brilliant future.

COLOR PHOTOGRAPHY.

The subject of color photography has occupied the minds of investigators from the earliest days of the art. Even Daguerre and Niepce in their work with the mercurialized film on polished silver gave an approach to its latest development, the Lippman process. We have given notices of this assumed triumph of photography—but which has been virtually relegated to its proper place, the science of physics. Lippman's process simply consists in the production of a film, by photographic printing or exposure, whose thickness varies with the color of the light which has fallen on it. This film, by the interference of light, produces the well known colors of thin films, the same that are seen in the soap bubble. Lippman has succeeded to a limited extent in producing an image of the spectrum. This is about as far as color photography has yet gone.

The low actinism of colors belonging to the red end of the spectrum necessitates a very long exposure. This objection might be overcome. But the whole development up to date is one of great interest from the physical standpoint, while it is of but little value from the photographic standpoint. It indicates in the art sense a very short step in advance. The production of a portrait or landscape by the Lippman process is yet an achievement to be hoped for. Its accomplishment is very problematical.

It is of interest to note the status of color photography, as an exaggerated report of the Lippman processes has been extensively circulated. When it is realized that the daguerreotype itself presents a strong analogy to Lippman's work, it will be evident that we should not be too sanguine of our hopes of an early realization of color photography.

Intelligence of the Horse.

Recently a New Jersey farmer, while passing along the street in New York, heard the well known "neigh" of his good old horse, which had been stolen from his barn last winter, six months having elapsed. The farmer turned, and there, sure enough, was the affectionate old animal, hitched to a butcher's wagon. The horse had recognized his master, and gave him the accustomed signal. The farmer recovered his property and the thief was arrested.

The Pioneer Steamer of the Pacific Ocean.

Nearly threescore years have passed since the Hudson's Bay Company's steamer Beaver floated down the Thames. The Beaver was the first European steamer to round Cape Horn and was the pioneer steamer of the Pacific Ocean, the passage from London to Astoria, Oregon, consuming 163 days. The Beaver was 101 feet long, 20 feet broad and the depth was 11 1/2 feet, the tonnage being 109 3/4. The boiler and the two side lever engines, of 35 horse power each, were made by Boulton & Watt at their Birmingham works. The engines cost £4,500 and weighed 52 tons. The vessel was built in the most substantial manner of live oak and greenheart, the timbers being held together by copper bolts. The Beaver was used as a fur trading vessel by the company, and on one of these trips coal was discovered on Vancouver Island. In 1849, during the gold excitement, many miners took passage on this little black steamer. In steaming out of Burrard Inlet in the fall of 1888 she struck a rock, and, wrapped in a sheet of troubled waters, with head resting on a huge barnacle-clad bowlder, the Pacific pioneer steamer Beaver passed into history. Unsuccessful efforts were made to float the Beaver and she remained on the rocks nearly four years. An attempt was made to take the Beaver to the World's Fair, but was abandoned, owing to her damaged condition and the cost of transportation. Messrs. McCain & Menzies, well known contractors of Vancouver, B. C., purchased the vessel and obtained 975 pounds of old brass and copper, which will be made up into souvenir medals. The number will be limited and each will be stamped with a number, to prevent any possibility of counterfeiting. The timber has also been worked up into souvenir canes, etc. Built and equipped at a period when steam navigation was in its infancy, it is scarcely a wonder that there should be a call for souvenirs of the first steam vessel to plow the broad Pacific.

Platinum.

The mining of this valuable metal is chiefly in Russia, and the following information is given by Mr. Geo. F. Kunz in the report of the mineral industries in the United States at the eleventh census. The two deposits in the Ural Mountains are the Goro-Blagodat or Isa region, in the basin of the river Isa, and the Nisjne Tagilsk or Demidoff district, on the Martin River. The former is under government control, while the latter is worked by private enterprise. In the latter field there were three large washing plants and a fourth is being erected. Besides these, the peasants have many small workings, for which they pay two-thirds of the produce as a royalty. The deposits are placers composed of serpentine bowlders, mixed with chrome iron ore, the platinum-bearing sand forming a layer of 6 inches to 10 inches in thickness on the bed rock, at a depth of 30 to 40 feet. The sand is mined by driving levels from a shaft, and is only worked in the winter, when the washing plants have to stand idle, as the water is all frozen. For washing the material, it is hauled in cartloads of about 1,500 pounds and emptied into a revolving screen. The small stuff is stirred up in water by two women and the heavier materials settle in riffles in the troughs. Both the tailings and the heavy sand are reworked. In two shifts of 12 hours—each shift, however, including 4 hours' rest—about 640 tons of sand are washed, yielding 2.7 pounds of platinum in each machine. The average daily yield of the whole of this district is about 9 pounds, worth about £2 per ounce, and the yearly production is about 1,620 pounds.

No details of the cost of mining are available, but the cost of labor for washing in the three plants for the 180 days during which the work could be done is about £7,000. Wages are not extravagantly high, as a driver gets 1.3 rubles a day for himself, horse, and cart, and he has to haul 60 loads daily. For each machine, 40 drivers, besides 16 workmen at 70 kopeks each and 4 women at 40 kopeks each, are employed.

Metal Surfacted Paper.

A well polished yellow brass or nicked sheet of metal is wetted by means of a paint brush or sponge with a solution of higher alkaline sulphide or hydrosulphide, for instance, a solution containing 5 parts by weight of potassium trisulphide or hydrosulphide to 100 parts of water, and in addition, 1 per cent of spirit which is added to remove any greasy particles which may be present. The plate is then immersed for a short time in a neutral solution of copper sulphate (1 to 5) and transferred to an acid copper bath in which copper is deposited on it. It is immersed in a zinc bath in which it receives a deposit of that metal, and is subsequently treated with a solution of hydrosulphate of ammonia, mercaptan, or similar compound or allylesulphide previous to pasting the paper thereon or causing the paper to adhere by paste in which the said substances are mixed. The metallic surface of the paper so produced is rubbed over, when dry, with a mixture of gold or silver cyanate with carbonate of potash in order to produce a real gold or silver paper.—C. Endrivoit, Berlin, Germany.