which Capt. Pim declared no one knows the position) should be visited, and a large number of accurate observations there taken.

A lunch was given to the two lieutenants in the afternoon, but nothing was then said of geographical importance.

Mr. R. G. Haliburton said that he considered the saga of Eric the Red, describing the voyage of his son Leif to Vinland, a poetic version of Bjarne's voyage reversed. Eric, driven from Norway, and afterwards from Iceland, discovered a dreary country, which he called Greenland, avowedly to attract emigrants thither. Subsequently the land sighted by Bjarne, and visited and colonized by Eric's family, was called by them, evidently for the same object, *Vinland the Good*. The length of the shortest day, the presence of Eskimos, the Norse maps, and geographical notices, all show that Vinland could not have been south of the north-western part of Newfoundland.

Mr. Haliburton also said that recently discovered Portuguese documents prove that the next oldest colony in America was *Terra nova*, embracing Labrador, Newfoundland, and Nova Scotia, which was explored by the Corte Reals in 1500–1502; and that commissions were regularly issued to them as governors up to 1579. In 1521 a patent was issued to Fagundes of all the lands between the Spanish colonies and 'the land of the Corte Reals.' He had recently discovered, while in the Azores, that two Portuguese colonies sailed thence to Cape Breton in 1521 and 1567, probably to St. Peters and Ingonische. The Spaniards, who annexed Portugal to Spain in 1580, sent a colony to Spanish Harbour (Sydney) between 1580 and 1597. He added that Cape Race (*Cabo raso* — 'bare cape'), the Bay of Fundy (*Fonda* — 'deep'), and other Portuguese names, still tell of this 'lost colony.'

The Rev. Abbé Laflamme then said, that the province of Quebec may be divided into two hydrographic basins, — that of the St. Lawrence, and that formed by the collection of lakes which fed the rivers flowing into Hudson's Bay. The name of only one of these lakes was known, — lake Mistassimi. It was certain, however, that there were many others of great size in its vicinity and on the peninsula of Labrador. He declared that all the maps hitherto published of lake Mistassimi were inexact. One thing only was certain, and that was, that it was larger than lake Ontario.

Professor W. Boyd Dawkins maintained that the former connection of North America with Greenland, Iceland, and north-western Europe is most conclusively proved by the distribution of the fossil plants and animals in the eocene and miocene ages. The tract of comparatively shallow water ranging from Greenland past Iceland to the Faroës and northern Scotland, and which isolates the deep waters of the Arctic sea from the depths of the Atlantic, formed the bridge across which the migration took place, the four-hundred-fathom line representing approximately the line of the ancient shores. The barrier became submerged towards the close of the miocene age; and then, for the first time, the Arctic waters united with the Atlantic, and arctic shells gradually found their way southwards into the area of the British isles.

Mr. J. S. O'Halloran then presented a memorandum with regard to Winnecke's exploration of central Australia, with notes on the employment of camels, and some extracts from his journals. The reference to camels reminded Mr. Torrance that they were formerly employed in British Columbia, but that the smell of the beasts so terrified horses that the government ordered their use to be discontinued.

The president of the section then made some remarks about the poor attendance at some of the meetings, — at one time there were but four persons present, besides the officers and reporters, — which he attributed to the unfortunate position of the building in which the meetings were held; and the section was then adjourned.

PROCEEDINGS OF THE SECTION OF ECONOMIC SCIENCE AND STATISTICS.

THIS section has been in existence almost from the foundation of the British association, having been organized as a section of statistics in 1833: economics were added in 1856. The range of topics considered has been very wide, and has included such topics as population, mortality, emigration, labor, crime, punishments, debt, wealth, trade, coinage, banking, insurance, poor-laws, schools, libraries, sanitary regulations, water-supply, pollutions of rivers, forestry, agriculture, stock-raising, imports and exports.

The section assembled at eleven o'clock on Thursday, in Synod hall, several blocks distant from McGill college, where most of the sections were located. Nevertheless, about 140 persons were present to listen to the address of the sectional president, Sir Richard Temple, of London, upon the general statistics of the British empire.[1] It was noticeable that the applause occurred when reference was made to the superiority of Great Britain, and but once when comparisons showed the United States to be superior to the empire. A vote of thanks was proposed by Prof. J. Clark Murray, of Montreal, and was supported by Mr. Edward Atkinson of Boston, who highly complimented Sir Richard Temple for his efforts in founding the school of British economical science. Professor Murray thought this section would be more interesting to Canada than any other; because, 1° it was not so abstruse, and 2° it treated of matters of vital importance to Canadian voters. He hoped soon to see a chair of economic science in McGill college.

Sir Richard Temple said he would accord the place of honor to the United States, and called on Mr. Atkinson to read the first paper, entitled 'What makes the rate of wages.' Mr. Atkinson said that the argument of Mr. Henry George in his 'Progress and poverty,' that the rich are growing richer, and the poor

[1] The address is printed in abstract in *Science* of Sept. 5, p. 214.

becoming poorer, as a whole, was not conclusive, and that the extraordinary circulation of the book in many languages showed how all-important was the question at this time. He therefore suggested, in reply, that, as it is generally conceded that somewhere and always there is enough and to spare, the question is only one of distribution, not of production. And yet distribution he held to be subsidiary to production, claiming that at no time should more be distributed than was produced in that period. That distribution is to 1° taxes, 2° profit, 3° labor, — the last receiving all that the others leave, and being measured by wages. The true wage which is due to the laborer is food, fuel, shelter, and other means of subsistence. The vast majority of mankind are wage-receivers. What determines the rate of their wages in terms of money? *High rates of wages are the natural and necessary result of low cost of production.* Especially is this so in the United States, where the people are homogeneous, means of intercommunication ample, and where there is no artificial obstruction to prevent commerce. Wages are therefore the consequence and remainder over after capital has received its profits. This remainder has been constantly increasing. This he illustrated by elaborate statistics, compiled from the books of two New England cotton-factories. The profits declined, having been 2.40 cents per yard in 1830; 1.18 in 1840; 1.11 in 1850; .69 in 1860; .66 in 1870; .48 in 1880; .43 in 1883; and .41 in 1884. The average annual wage per operator had increased at the above dates as follows: $164, $175, $190, $197, $240, $259, $287, and $290.[1] Profits and wages together showed a constant increase due to increased efficiency and subdivision of labor, improved machinery, and a consequent lower cost of production. Capital alone made this possible. Vanderbilt was pronounced the greatest communist in the United States, in that, for every cent he saves from his railroads, he saves a dollar to the masses in the cost of transportation, and thus aids a low cost of production, which, in turn, gives a high rate of wages. Mr. Atkinson incidentally pointed out, as against the Malthusian theory, that as yet a field ten miles square would hold the population of the earth, while one twenty miles square would seat every person; and that, but for the interdependence of nations, an enormous part of the products of our soil would rot as valueless. It is our duty to show the masses how, in the distribution, each may get his share; or, as Gladstone has said, to weave the web of concord among the nations.

The paper was discussed at length by Sir Richard Temple; J. B. Martin of London; Prof. H. S. Foxwell of St. John's college, Cambridge; Mr. Swire Smith, of the Royal commission on education, Lowfield, England; David Chadwick of London; and Cornelius Walford, the secretary of the Geographical society, London. The general tenor of discussion was highly complimentary to the essayist. Mr. Martin thought labor and capital unavoidably in opposition, not to say antagonistic; and that the rate of wages would be determined by the margin existing between the cost of wages and what the laborer is willing to confine himself to for a living. That margin which so attracts emigrants he found excessive on this continent, and was totally at a loss to explain why it required ten cents to get his boots blacked in Montreal.

[1] All figures are reduced to gold basis.

Professor Foxwell said that in Ricardo's time capital was the starting-point for discussion; now it is labor. Gen. F. A. Walker has done much, by his political economy, to influence thought in England. In the distribution in question, every thing depends upon the *equality of the bargainers.* As laborers have become wiser, they have bargained for a better distribution. In the United States this has been potent. The diffusion of property as a reserve is a very important aid to bargainers. England much needs to educate its laborers, and secure a diffusion of property. Monopolies he had regarded with distrust, but is coming to think them desirable: they must, however, be under some public control and restraint. He pointed out that the rise in factory wages had been coincident with the rise of labor-unions, and doubted whether capitalists voluntarily raised the wages. Capital invested in factories was doubtless receiving a lower percentage of profit, but interest is also lower. Mr. Smith could see, in the facts presented, only Adam Smith's law of supply and demand regulating rate of wages. Mr. Chadwick demurred from the Smith doctrine. Disturbing elements have come in. By combination English laborers have forced higher wages, and the hours of labor per week from sixty in 1849 to fifty-six and one-half in 1884. Capitalists have always known their power: the laborers, only recently. Germans, French, and Swiss work sixty hours, solely because they do not realize their power, and combine for a reduction. Mr. Atkinson admitted that character, in the last analysis, makes the rate of wages. He thought, that, although legislation had attempted in Massachusetts to regulate hours of labor, the changes cited have come about naturally, and regardless thereof.

Three papers on savings banks followed. Mr. W. A. Douglass, of the Freehold and savings society of Toronto, gave the history and described the management of loan and savings companies in Ontario. Starting in 1855, the number has reached 73, with assets of $79,500,008. Seven per cent is obtained in Ontario, and nine per cent in Manitoba, on good mortgages. Since 1874 the companies have obtained some money from England, the amount so handled amounting to $25,679,803. Mr. Stephen Bourne remarked upon the opportunity thus presented for England to invest surplus funds, and of her duty to thus aid her colonies. Mr. Atkinson spoke of the 800,000 accounts averaging $300 each, in Massachusetts savings banks, and of the accumulations made by Irish laborers Mr. J. Cunningham Stewart, of Ottawa, sent a paper upon the history and progress of post-office savings banks, which contained the statistics of the subject from official sources. After sixteen years' growth, Ontario has 57,296 depositors, and Quebec 9,386. The deposits amount to $13,245,000, one-half of which is held in Montreal and

Quebec city. Mr. Thomas D. Tims also sent a paper on dominion savings banks. Vice-president Martin remarked upon these papers, deprecating the tendency of people to avoid making their own investments by intrusting them too much to such institutions.

A paper on Irish emigration was read in behalf of Mr. James A. Tuke, the founder of Tuke's emigration bureau. This paper graphically pictured the abject condition in Connaught and many Irish counties. Some 200,000 families, or 1,000,000 persons, occupy small holdings never taxed as worth over $20 to $50, and consisting of from one to ten acres of bog-land. This at best yields not over nine months' subsistence, leaving three months' dependence on charity. The least evil for remedying this state of affairs was found in emigration to America. At an expenditure of $68,500 he has aided 9,482 to seek a better home in the new world. Of this money, 220,000 was from the government, and the remainder private gifts. Over seventy-seven per cent were the young and healthy, but too poor to obtain transportation money for themselves. Once located, however, they have been industrious, and at once set to work to send back savings to their relatives, thus enabling them also to emigrate. Not less than $25,000 was so returned to Ireland in 1882 and 1883, one shop-keeper having cashed $1,000 of such drafts. Of the counties furnishing emigrants, seventeen per cent of the population was removed. The people were located in 165 different places, 148 in the United States, and 17 in Canada. Less than five per cent had ever uttered a complaint as to their new condition. The paper was discussed by Mr. John Lowe, Department of agriculture at Ottawa, and by Major P. G. Craigie of London, both of whom had observed the good effects of Mr. Tuke's work. The latter said, 'The Irishman will succeed best out of Ireland.'

Mr. W. Westgarth, president of the Melbourne chamber of commerce, read a paper on the British Empire in North America and Australia. He made elaborate comparisons between Canada and Australia, and furnished valuable facts, especially concerning the latter. He admitted that a drought had swept away ten million sheep, but said they had sixty-six million left. The dominion exports of 1882 were valued at $97,671,000; the Australian, at $255,000,000, chiefly consisting of wool and gold. Victoria has already exported £210,000,000 sterling in gold. The dominion has 9,000 miles of railway; Australia, 7,000 miles. Dominion annual revenue, $36,000,000; Australian, $110,000,000. Dominion debt, $153,661,000; Australian, $496,250,000. He urged the need of closer ties between Great Britain and her colonies.

On Friday, Vice-president Martin read a paper on media of exchange, or notes upon the precious metals, speaking of 1° the metals, 2° coin, 3° bank-notes, 4° instruments of credit. The discussion was participated in by Mr. Chadwick; Mr. Atkinson; Mr. Sidney Fisher, M.P.; Mr. Stephen Bourne of Wallington, Surrey; Hon. C. W. Fremantle, Master of the royal mint, London; and Dr. James Edmunds of London. The latter spoke of small bank-notes as a most serious media of infection, the germs of cholera, small-pox, scarlet-fever, etc., being retained therein. Coin may be disinfected by heat. The paper and the discussion included such topics as the advantages and disadvantages of coin, the supposed gold depreciation since the opening of American and Australian mines, the dangers from inconvertible notes, the improbability of changes in the English sovereign, the proper method of meeting the expense of converting bullion into coin, the blessings of a good banking-system, with allusions to those of the United States, Russia, and other nations. Dr. Edmunds regarded the value of gold as dependent on so many variables, that its actual value cannot be ascertained. Mr. Atkinson thought gold had lost some of its purchasing power, and Mr. Martin thought it had steadily increased.

Mr. Michael G. Mulhall of London, author of the Dictionary of statistics, read a paper upon the debts of nations. The debts of the leading nations in 1884 he reported in millions of dollars, as follows: France, 4,975; Great Britain, 3,780; Russia, 2,775; Austria, 2,540; Italy, 2,190; Germany, 1,670; Spain, 1,650; United States, 1,525; Spanish America, 975; India, 800; Turkey, 740; Australia, 580; Egypt, 565; Portugal, 535; Holland, 420; Belgium, 390; Japan, 335; Canada, 190; Roumania, 135; South Africa, 115; Norway and Sweden, 100; Greece, 90; Denmark, 60; Servia, 20. Grand total, $27,155,000,000. From 1848 to 1870, the annual increase averaged $99,000,000; from 1870 to 1884, $115,000,000. The increase, however, has not kept pace with the increase of wealth. Of existing debts, sixty per cent stand for war expenditure, and forty per cent for improvements; but of debts incurred since 1848, fifty-five per cent was for peace, and forty-five per cent for war. The paper was discussed by Mr. Walford, Dr. Edmunds, and Mr. Atkinson. The contracting of war-debts was severely denounced; and, although the essayist regarded debt as a convenient investment, as no injury to the working-classes, and as not to be feared, the tenor of criticism was decidedly adverse to these ideas. Mr. Atkinson especially criticised the bond-holder, if not also a producer, as a burden upon society. To ascertain what burden a national debt is, we should consider, not population, not accumulated wealth even, but the *annual national product*. Burden is in ratio to net savings. A people which cannot save any thing from the current product is unbearably burdened by a public debt. How many laboring men in Europe, he asked, can save twelve pounds per year? The U. S. debt, he said, had been reduced from eighty-eight dollars per capita to twenty-five dollars per capita. He claimed that it reached $3,000,000,000 at the close of the war, although the official debt statements never showed so much. There were outstanding and unaudited liabilities which made the difference. Before these had been adjusted, the debt had been reduced by a similar amount. He prophesied that the progress of this continent would compel Europe to disband her armies, and pay off her debts, in order to get upon a competing footing.

A paper sent by Mr. J. McLennan, upon Canadian

finances, was discussed by Mr. Stephen Bourne, Mr. Hale of Montreal, Mr. Atkinson, Mr. Thomas White, and others. Some criticisms of Canadian tariff-laws and the sale of public lands were made by Englishmen, and replied to with spirit by Canadians. The latter usually professed to be free-traders, but defended the tariff, as required by very peculiar circumstances, such as its proximity to the United States. The American theory of the subdivision of public lands was explained by Mr. Atkinson, who also illustrated public subsidizing of railroad schemes by the history of the Hoosac tunnel. The interest on this debt would alone pay for transporting the bread of New England from the far west to Boston.

Major P. G. Craigie, secretary of the Central chamber of agriculture, read a paper on agricultural production with special reference to the supply of meat. With an increase in the population of Great Britain since 1868 of 16%, there has been but 4% increase of cultivated area, 11% increase in cattle, and 24% decrease in sheep. Consequently the importation of meat has grown from 100,000 tons in 1868, to 316,000 tons in 1876, and to 450,000 tons in 1883. The total consumption in 1868 he placed at 1,374,000 tons, or 100 pounds per capita; in 1883, at 1,774,000 tons, or 112 pounds per capita. The paper was discussed by Professor William H. Brewer of Yale college, Mr. Atkinson, and others. Mr. Atkinson said he had tried in vain to ascertain the consumption of meat per capita in the United States. A year's supply of meat and flour had been assumed to include three hundred pounds of the former and one barrel of the latter. To move this year's supply from the west, its place of production, to Massachusetts, costs but one day's labor, $1.25. He also spoke of the negro rations — three and a half pounds of bacon and one peck of corn meal — as producing a given amount of force at the smallest cost of any diet among any people of the earth, the cost being but seven cents per day. The reason is that the 'hog and hominy' are peculiarly adapted to each other for ready and perfect digestion.

Professor John Prince Sheldon and Prof. W. Fream, of the Downton college of agriculture in Salisbury, read interesting papers upon British and Canadian agriculture, as did Prof. W. Brown upon Canadian agriculture. Papers by Gen. M. Laurie of London, John Carnegie, M.P., of Peterborough, Ont., and Sydney Fisher, M.P., had been prepared upon the agriculture of Nova Scotia, Ontario, and Quebec; but there was not time to present them, the section having been in continuous session for six hours. Propositions to prevent the entrance of cattle-disease from the U. S. were repeatedly made and favorably received. It was shown that the acreage in Great Britain devoted to wheat and corn is constantly decreasing, and that to grass and pasturage increasing. Farm-rents are declining, and must continue to decline. Railway charges there are exorbitant. Wheat can be brought across the ocean cheaper than from some counties by rail. Several gentlemen discussed the papers. Peter Price, an English landowner, uttered his astonishment at what he had seen here: his best tenants are leaving him, and he cannot rebuke them. His estate of three hundred and fifty acres is going into pasture, and he cannot get enough out of it to pay taxes. The thrift of Canadian agriculturists and the embarrassments of Great Britain were brought out in the most striking manner, much to the satisfaction of Canadians, the amazement of the British, and the amusement of Americans.

On Monday a paper by Mr. Stephen Bourne was read upon the interdependence of the several portions of the British Empire. After presenting some statistics, Mr. Bourne entered upon an exhortation to the colonies to combine with the mother country in refusing to buy from nations which enforce protection. 'We should,' said he, 'teach the nations that we have a world of our own.' He would not answer protection with protection, but with absolute cessation of trade with those who are not 'fair-traders.' Sir Richard Temple suggested that England could not, so far as now known, get its long-staple cotton anywhere but from the United States, a high-tariff nation. Mr. Chadwick denounced the proposition, and said the author dare not make it, were the section in session in the British isles. 'This,' he said, 'would starve half our people and half our cattle' The president felt called upon to defend freedom of speech, although not agreeing with the speaker. Amid much excitement the Canadians rushed to the defence of their tariff, and openly declared that if they must choose between such an alliance with Great Britain and one with the United States, they had much to gain and little to lose by choosing the latter. Mr. Atkinson indicated the satisfaction which the United States might feel at such an arrangement. It would keep her products at home, glut the market, make labor much cheaper, and so reduce the cost of manufactured fabrics. She would then be able to compete in the world's markets, as she cannot now with English manufacturers! Mr. Thomas G. Haliburton said the foreign trade of England was decreasing, and that at the present rate of decrease but twenty years were needed to terminate it: hence the need of wise dealings with the colonies and foreign nations. Mr. Roswell Fisher of Montreal said such a policy would not do for the dominion. 'We Canadians exist here on the sufferance of the United States' [loud shouts of No, No!]. Should England retaliate upon the United States, it could crush Canada with a prohibitory tariff. But politically and socially Canada was nearer the latter than the former. No number of ocean telegraphs and swift steamers can destroy American unity [great excitement]. Sir Francis Hincks, a Canadian politician of fifty years' experience, being loudly called for, said, 'Let well alone.' Canada does not want representation in the British parliament and in army tax-lists, nor is she interested in her Majesty's foreign policy. He emphasized American friendliness, and the necessity of meeting the tariff of the United States wisely.

Mr. R. W. Cooke Taylor, inspector of factories, Treston, Eng., read a paper on factory acts. These are for the protection of women and children. Mrs.

King and Mrs. Hallett discussed the paper, expressing dissatisfaction with the act, and saying women could take care of themselves. Mr. Robert C. Adams of Montreal read a paper on the phosphate industry of Canada. In 1883 it amounted to 17,500 tons. Phosphate lands have sold as high as $1,250 per acre. Mr. Hughes, Mr. Martin, and Sir Richard Temple discussed the paper. A valuable paper on the fisheries of Canada, by Mr. L. Z. Joncas, was read by Mr. Thomas White, M.P.[1] The paper was discussed by Mr. Cornelius Walford and Mr. C. W. Smiley of the U. S. fish-commission. Several forestry papers closed the sitting, — Professor Brown of Ontario, on the application of scientific and practical arboriculture to Canada; Mr. J. P. Hughes, on the necessity of forest preservation; Mr. A. T. Drummond of Montreal, on the distribution of Canadian trees; and Mr. F. B. Hough, on the future policy of the forest management of the United States. Mr. Walford remarked that forest culture in England pays four per cent profit, and in the United States seven per cent. Mr. Caruthers of the British museum also made remarks. The anthropometric committee presented a printed report, including observations on eyesight by Mr. C. Roberts. This report contained valuable tables. On Tuesday Mr. Cornelius Walford spoke upon land and water communication. Mr. E. Wragge and Alexander McDougall presented a joint paper upon the same topic. A paper by Emile de Laveleye, upon land laws, was read by the secretary. Miss Maria Rye, Mrs. Burt, and Mrs. Joyce each read a paper on female emigration. C. Le Neve Foster read a paper on the relative dangers of coal and metal mining. Many of the papers were presented by the authors in printed form, and printed abstracts of many others were circulated.

PROCEEDINGS OF THE SECTION OF MECHANICAL SCIENCE.

THE mechanical science section of the British Association appears to be in a prosperous condition, as was intimated, indeed, in the opening paragraph of the address of its president, Sir Frederick Bramwell: this is due, no doubt, to the fact that its scope is much wider than its name implies. The president's address was instructive as well as witty; it was in the form of an apology for the practical character of the section, and exhibited in detail the interdependence between it and the others, showing it to be complementary to them; but the distinguished author did not fail to scatter valuable suggestions throughout, and to indicate some lines of past and future progress. The address, however, contains no carefully digested summary of engineering progress for the past year or up to the present time; and though many valuable papers, prepared by request, summarize progress in particular directions, the general scientific reader must seriously regret the fact. The various criticisms upon the hampering action of the government toward engineering enterprises, such as electric lightning, the telephone, the Channel tunnel, brought out the strong feeling of the English members, that the government should confine itself to governing. The courtesy shown the president in the delivery and acceptance of his address was a pleasant feature: the presidents of the association and of the physical section, as well as the sectional vice-presidents and secretaries, were upon the platform, and the former moved a vote of thanks. In doing so Lord Rayleigh commented upon the Channel tunnel and other government interference; and was followed by Vice-president Thurston, who seconded the motion, expressing the American sympathy with the obituary notice of William Siemens, and cordially inviting the members to take part in Section D at Philadelphia.

The multiplication of section officers is to be noted; there being no less than eight vice-presidents, four secretaries, and a large sectional committee, among whom appear the following gentlemen from the United States: Messrs. Coon, Emery, Hoadley, Leavitt, and Woodbury, and Professors Barker, Bell, Rogers, and Webb.

Many of the papers read were 'progress papers,' containing masses of detail of little interest to the general reader. The importance and extent of some of them render it a matter of regret that they were not generally in print, and that they were presented in so hurried a manner. In many cases, an abstract setting forth the main features of the paper, and comparing and emphasizing the main facts, with illustrations and graphical representations of results, would be far more effective when time is limited; and though such abstracts involve labor, they are of great permanent value to the paper.

The papers were classified as follows: First session, civil engineering; second, mechanical engineering; third, electrical papers; fourth, miscellaneous. Some of them were prepared by request to describe American practice, and some attempt was made to have comparative English papers.

Mr. B. Baker described the Forth Bridge. The expected cost of this enormous structure is £1,600,000. Excluding the half-mile of approach viaducts, the bridge will be over a mile long, consisting of three cantilevers, each over 1,500 feet long, and two connecting trusses of 350 feet each. Cantilevers stand on the two (Queensferry and Fife) banks, and one rests on the only island (Inchgarvie) midway; they are to be 340 feet high by 130 wide at their centres, tapering to 40 feet by 35 at their ends, where they sustain the ends of the connecting trusses. The material is steel, to be put together (after the English fashion) by riveting as each plate is placed in position. Work is now being done on the piers, and some steel is ready for the superstructure; nearly 50,000 tons will be required. The bridge leaves two arched water-ways of 1,700 feet, with 150 feet clear central height at high water, and a half arch at each side. It was commenced about twenty months ago, and no difficulties are anticipated. Fourteen vessels, seventy-two steam and other cranes, and twenty-eight steam-engines, with numerous special machines,

[1] This paper will be published in the U. S. fish-commission bulletin.