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KLONDIKE AND CALIFORNIA COMPARED.

The expected rush to the Klondike is already well under way, and judging from the present indications, it is probable that the army of fortune-hunters which will enter this inhospitable region during the coming season will far exceed in numbers the emigration to California in the days of forty-nine. To those who foresee the disappointment which is, of necessity, in store for the majority of these people, it would be a consolation to be assured that the Klondike exceeds the California gold fields in richness. Unfortunately there is no evidence that it does. The Mining and Scientific Press, of San Francisco, which from the time of the first tidings of the Klondike discoveries has done good work on the Pacific coast in allaying the Klondike fever, has recently published some comparative figures in response to a correspondent's question as to whether the Klondike placers are richer than were those of California. The figures are quoted from J. Ross Browne's "Report to the Government on the Mineral Resources of the Pacific States," made in 1867. This was a sober, authentic report from an official mining expert, who had no motive to give other than an exact statement of the case.

According to this authority, one claim in Calaveras County produced \$250,000 from an area 100 feet long by 40 feet wide, and ninety pounds of gold were taken out in twenty-four hours. One claim in Placer County yielded \$500,000 and another in the same county \$2,000,000, and near Springfield, Tuolumne County, single car loads of "pay dirt" panned out one thousand dollars each. These figures were gathered for government statistical purposes and may therefore be taken as correct. On the other hand the reports which have come from the Klondike are largely hearsay or emanate from the thousand-and-one transportation companies whose interest it is to exaggerate the richness of the new El Dorado. Allowing, however, that the Klondike reports are true, it is evident that the richness of the placers barely equals that of the California placers; certainly it does not exceed it. It is probable that not one in a hundred of the California miners found the fortune or even a hint of the fortune for which he set out. The proportion is likely to be even smaller in Alaska.

THE UNITED STATES CIVIL SERVICE.

There were, in 1897, in the civil service of the United States government, 178,717 positions, of which 87,107 were in the classified list, to be filled by competitive examinations, and 91,610 unclassified, two-thirds of whom were fourth-class postmasters, the others ranging down to mere laborers. Endeavors to establish the government civil service on a basis of competitive examinations, offices then to be held during efficiency, without regard to party changes, were made as far back as 1853 and 1855, and again in 1872 and 1874, but it was not until 1883 that the subject was taken up in such a practical way as to largely affect the appointment and retention of employees of the government. The regulations then established were quite stringent, and they have been made more so by successive administrations, the scope of the law having been also extended and new classes of service brought under the control of the Civil Service Commission.

From a recent revision of the manual of examinations for the classified civil service we note a few of the leading particulars. The examinations are arranged for according to the following divisions of the service:

1, departmental; 2, custom house; 3, post office; 4, government printing; 5, internal revenue. In all, except the first of these divisions, the designation indicates, perhaps, sufficiently the nature of the positions to be filled, but it may be remarked that the departmental service covers the railway mail and Indian attaches, the pension agencies, steamboat inspection and light-houses and life-saving, the mints and assay offices and sub-treasuries, and the engineer and ordnance departments at large, as well as civil, steam and electrical engineers, draughtsmen, etc. For the position of assistant examiner in the Patent Office, it may be noted, a specially rigid examination is called for, covering physics, inorganic and organic chemistry, mathematics, technics, mechanical drawing and French and German. The lists of questions to be answered by applicants for positions are extremely searching, and the tests made at the examinations are such as leave but little room for imposing on the officers of the commission. They are such as are calculated not only to test the special fitness of the employes for each branch of the particular work in which they desire to enter the government service, but, in all the more advanced grades, their general capacity, aptitude and attainments.

The general examinations are held twice a year, in March and April and in September and October, at designated places in all the States, and applications must be received by the commissioners at least ten days prior to the date of examination, such applications being made on special forms prepared therefor. Full details as to all particulars affecting these examinations may be obtained at most of the public libraries, showing also those for which schedule dates are assigned and some which will be taken only when

vacancies occur. John R. Procter, Washington, D. C., is at present the president of the Civil Service Commission.

The civil service law has met with not a little opposition from the politicians of both parties, many of whom have desired to dispose of official positions as the rewards of effective work at the polls, irrespective of the fitness of employes for their places; but it is safe to say that the great majority of the people of all parties are strongly in favor of the law, and would prefer to see it extended in its operations, to include a still larger number of those who work for the public. Permanence of situation for all who work honestly and efficiently in their several lines of duty should be no less the rule in the government service than in all lines of private enterprise, and it is no less true that regularly earned promotion should follow such service.

THE COMPLETION OF THE BROOKLYN NAVAL DRY DOCK.

In our issue of December 25, 1897, we gave an illustrated description of the methods which have been adopted in repairing Dry Dock No. 3, at the Brooklyn Navy Yard. It was expected at the time that repairs would be completed in a very few weeks, and this sorely needed work placed at the disposal of the navy. Unfortunately, just at the time when the closing in of the new apron was being completed, there occurred one of those unforeseen and unpreventable accidents to which engineering works of this character are always liable. Two fresh water springs made their appearance, one within and the other just outside the apron, and under their action a considerable area beneath the apron, the wing-walls and the cofferdam began to subside. At one time matters were extremely critical, for it looked as though the cofferdam and entrance might collapse and the whole dock be wrecked beyond recovery.

The greatest possible force was crowded upon the work, the new lines of sheet piling being driven with all possible speed and the flooring laid on so as to enable the dock entrance to be partially flooded, with a view to reducing the flow of the springs and stopping the disastrous undermining. This has now been done, and two lines of 12 x 12 sheet piling driven as deep as it will go now extend across the entrance, one at the outer edge of the apron and the other at the outer wall of piling which surrounds the dock. New wing-walls have been built, and the entrance is now the first-class engineering job that it would have been if properly designed and built in the first instance.

The value of this dock to the country just now is simply inestimable in view of our critical foreign relations; for it is our only dock on the Atlantic coast which will safely admit our first-class battleships, such as the "Iowa" and the "Massachusetts." In the event of a war we could not send these to the dock at Halifax, as we recently did the "Indiana," because the owners of the dock would be prevented by the neutrality laws from placing it at our disposal.

OUR TRADE WITH EUROPE.

A study of the statistics of our foreign trade for the past year shows that while the United Kingdom is our largest customer it does not take so large a proportion of our exports as formerly. Ten years ago the total value of our exports to the United Kingdom was \$359,734,531, or over 50 per cent of our total exports; whereas in 1897 the proportion had fallen to about 44 per cent. Though it has decreased relatively, it still reaches the great value of \$482,694,024, an increase of over \$120,000,000 in the nine years under consideration. The total increase in our exports to all countries during the same period has been 59 per cent. Our exports to Germany have risen from about 8 per cent of the total to about 12 per cent; our exports to France have remained stationary at about 6 per cent; while those to the Netherlands have risen from 2 to 5.3 per cent.

The large increase in our exports, amounting to \$94,000,000 over the previous year, was, of course, chiefly due to the increased demand for our wheat and corn, the increased export of all cereals amounting in value to some \$70,000,000. The increase in exports of iron and steel was \$14,000,000; in bicycles it was \$3,000,000; in copper, \$3,000,000; and in lumber and manufactured articles in wood, \$5,500,000. We have already in a previous issue referred to the gratifying excess of our exports over our imports. This amounts to \$1,281,741,351 for the past five years; and there is special significance in the figures when we bear in mind that the period has been marked by depression and various influences which have tended to disturb business confidence.

BURNING FIELDS OF ICE.

BY E. B. KNERR.

It seems a somewhat surprising statement to make that on the ice-covered surface of a Kansas lake it is possible to build bonfires by simply breaking through the ice and applying a match to the surface of the water. The flames will shoot up as high as a man and

will burn brightly for a minute or two. This is what has been possible for several winters on Doniphan Lake, Kansas, and on one of its tributary streams.

The fuel for these fires is natural gas, which bubbles up through the water the year round, but it is only during the very cold winter nights that it is thus temporarily stored under the ice in immense bubbles or pockets, sometimes ten to twenty square yards in extent. Puncture these bubbles with a chisel, apply a lighted match, and one has a roaring flame before which the skater may warm his benumbed fingers. The experimenter must be careful to stand between the wind and the jet of gas as he lights it, or he will have his clothing singed before he can get out of the way of his impromptu torch.

There are places where the gas supply is so abundant as to prevent the ice from forming, except on the very coldest nights. When such places are frozen over they remain covered only a few days, for the gas, coming from a considerable depth in the earth, is so warm that it soon melts a passageway through the ice and escapes. The present winter formed ice of fifteen inches thickness on the lake, and yet some of the areas of gas supply were not frozen over. Near the entrance of one of the creeks into the lake the water is quite shallow and the bottom may be readily seen. Here the gas has formed regular channels up through the mud, and out of these large bubbles of gas are discharged every few seconds.

Doniphan Lake is located about four miles north of Atchison, Kansas, and is a river lake; that is, it was formed from a bend of the Missouri River by the water taking a short cut across the narrow neck of the bend, thus leaving the old bed to be occupied by a beautiful horseshoe lake about five miles in length. This happened during the high waters of the spring and early summer of 1891.

Because the lake is thus comparatively recent in formation, some observers have contended that the gas which collects under the ice is only marsh gas. But the supply is too great to be accounted for in that manner. Were it marsh gas, it would rise more equally all over the lake, for the bottom is everywhere about the same. On the contrary, the gas is supplied only in certain localities, and the eastern arm of the lake is without gas. Besides, the places of discharge are the same the year round. On the Missouri side of the river are three other lakes of like formation: Mud, Sugar and Bean Lakes. These do not show gas except in occasional very small bubbles.

It is not surprising that natural gas should be found in eastern Kansas. A boring at Kansas City, about fifty-five miles south of Doniphan, gave a small supply of gas a few years ago. Ninety miles southwest of Kansas City, at Iola, Kansas, a gas well, in recent years, furnished seven million cubic feet of gas per day.

There is no doubt that the Doniphan gas is true natural gas, and comes from the interior rocks of the earth. The question of quantity can only be determined by prospecting. Should a "gusher" be struck here, it would be a great find, for St. Joseph, Mo., is only sixteen miles to the north, Atchison is practically on the field and Kansas City is less than sixty miles to the south.

THE PUBLIC LANDS OF THE UNITED STATES.*

Nearly one-third of the whole United States, exclusive of Alaska, is still in the hands of the general government, the greater part of this being open to entry and settlement under the Homestead act. The great bulk of these vacant public lands lies within and west of the Rocky Mountain region, considerable areas, however, remaining in Florida, Alabama, Mississippi and the States west of the Mississippi River. The lands within the western half of the United States are, for the most part, within an arid climate, and although the soil when watered is very fertile, yet the scarcity of water supply renders it difficult, if not impossible, for the settler, unaided, to make a home.

During the past twenty or thirty years the development of agriculture by irrigation has proceeded rapidly, until at the present time nearly all of the easily available sources of water supply have been utilized. There remain, however, many large rivers whose flow has not been diminished by the diversion of water for irrigation, and also many opportunities for the construction of great reservoirs in which floods can be held until the season when water is required.

The construction of the great irrigation systems by which thousands of acres can be rendered susceptible of irrigation requires enormous capital. A number of large enterprises of this character have been built by corporations, but, as a rule, these have not been profitable. Nearly all of them are now bankrupt, owing to the difficulty of selling lands or water rights to persons who can successfully till the soil and pay the annual charges for maintenance.

Irrigation is an art which requires many years of

practice, and the average farmer, coming from humid lands, meets with so many disappointments and failures that he is apt to become discouraged, and, with small means, is barely able to obtain subsistence, much less to make the payments required by his contract.

The canal systems have, as a rule, cost considerably more than anticipated, owing to unforeseen difficulties or accidents. The interest charges and cost of maintenance have eaten up the resources of the companies, so that the history of most enterprises of this character has been a series of financial disasters, although the systems, as a whole, from an engineering standpoint, have been good. The great question for the American people is how to utilize the vast area of vacant fertile land so that it shall be used for homes for future millions. With forethought and wise laws, it will be practicable for a population as large as that east of the Mississippi River to find homes in the West, but, with the haphazard methods prevailing and lack of systematic control, it is doubtful whether a small proportion of these can be accommodated.

The laws governing the public land were made to suit the conditions of the Ohio and Mississippi valleys, and the attempt to apply them in the arid West has been disastrous to the interests of the people as a whole, allowing favored individuals to grasp the scanty water supply and thus hold in tribute thousands of acres, preventing others from sharing in what should be the common property.

Only a small proportion of the vacant public lands can be irrigated, on account of the lack of sufficient water; but even this small amount, being widely scattered, will render possible a large population. The remaining land is, for the most part, valuable as grazing, although there are vast tracts originally covered with forests upon which trees will grow, if not wantonly destroyed. The public forests, however, have been recklessly pillaged and fires, set by accident or design, have destroyed timber and woodland of inestimable value in the future development of the country.

The land laws are confessedly poor and their enforcement necessarily weak. Everyone is apparently interested in obtaining what may be of momentary advantage or pleasure to himself, with utter disregard for the future. With the reckless destruction of the forests, it is believed by many that diminution of the water supply has followed.

The public lands being open to everyone and grazing permitted everywhere, it results that herds and flocks wander at will, pasturage being governed largely by questions of the supply of water for drinking. Most, if not all, of the springs have been seized upon by cattle companies, who, from this point of vantage, exclude others from the vicinity. Where water is comparatively abundant, there has been a tendency for the stock to increase to the limit of the food supply, and, as a result, the vegetation has been eaten so close that many of the more nutritious forage plants are said to have been exterminated from certain areas. Thus, from all sides the public lands are being plundered and their value reduced, while the man who would make a home is at continually greater and greater disadvantage, owing to the fact that, apparently, no one is charged with the duty of looking to the future and protecting the grazing, woods and water from injury.

Since the time of the revolution, the public lands have served as the outlet for the energies of the people. During the prevalence of hard times, men out of employment could go West, take up a homestead, and, by their own labor, secure a competence for their children. The public lands are still of enormous extent, and this condition might continue to prevail for many decades, but now has almost ceased, owing to lack of forethought in ascertaining the water supply and in protecting it so that all men might have opportunities of utilizing it to the fullest extent. The mischief in many localities is now past remedy, but in others it may be possible for the general government of the States to construct the necessary works by which the fertile arid lands can become the homes of many prosperous people.

The easily available sources of water supply have been taken by individuals or corporations. These have built ditches and canals by which several millions of acres have been brought under irrigation. The smaller enterprises have, as a rule, been successful, and, as in the case with the Mormons in Utah, the farmers dependent upon irrigation have been more prosperous than those of any other part of the United States. The large corporate enterprises have, as a rule, been financial failures, owing to the difficulty of selling their lands or water rights to farmers. There remain opportunities for the construction of many great irrigation systems requiring enormous capital; but since it is doubtful whether these can be made to pay a fair rate of interest, it is improbable that investors will risk their money.

The construction of these great canals and storage reservoirs is a matter of prime importance to the State and nation, as in the case of harbors, lighthouses and other works pertaining to navigation. Although these do not pay directly, yet their indirect benefit is such as

to justify large annual expenditures. In the case of irrigation works there is no doubt but that the cost of reclamation will ultimately be returned, and possibly a small interest on the first investment, so that the government will, in the long run, be reimbursed.

Before the work of reclamation on a considerable scale can be undertaken, it is necessary to be fully informed of all the conditions, and to ascertain as nearly as possible what will be the probable water supply. Investigations of this character are being undertaken by the United States Geological Survey, maps prepared and systematic measurements of various streams being made. Not only is surface supply being ascertained, but a careful study is carried on of underground structure, in order to bring together data concerning the possibilities of obtaining water by pumping or through artesian flow. The results of these investigations are published from time to time in the annual reports of the Geological Survey and in special bulletins dealing with various phases of the subject, and known as the water supply and irrigation papers.

When all the water supply has been utilized that may be obtainable, it is probable that nine-tenths of the public land will still remain unirrigated. Much of this is valuable for grazing, and, if proper laws are enacted, such that farmers and cattle companies can be secured in their enjoyment of certain definite tracts, it will be possible to enormously increase the pastoral industries. A system of leasing must be adopted in the near future giving preference to the small farmer or settler, so that he may be induced to make a permanent home.

The public forests, so necessary for the growth and development of the country by furnishing timber and firewood and in protecting the water supply, should be held by the government and guarded from fire. The experience of other countries has shown that this can be done at relatively small expense and the timber used, the young growth being protected so that the supply is continually renewed. It is practicable to inaugurate a system of supervision which will be amply supported from the sale of timber. The forests, instead of being rapidly destroyed, will tend to increase in value. Before this can be done it is necessary that the people of the United States awake to the present conditions and give the matter of their heritage a proper and businesslike consideration.

LONDON'S UNDERGROUND ROAD.

The American companies obtained the entire contract to equip the London Underground Railway, including the electric locomotives, under the following guarantee: Efficiency of steam engine at full load, condensing, 92 per cent; efficiency of three-phase generators, without counting the current for exciting the field magnets, 95 per cent; average efficiency of transmission of current from the power house to the locomotives, including the loss in transforming the current from a high voltage to a low voltage under a full load, 90 per cent; efficiency of the locomotives under full load, 90 per cent.

The entire length of the new line is 5½ miles, and there will be ten stations between the two terminals. At each station there will be large electric elevators to carry the passengers to and from the street. The train service will be carried on by 32 trains of 7 cars each, the seating capacity of each train being 336 passengers. The average speed of the trains is to be 14 miles an hour, including 20-second stops at each station. The maximum speed between stations will be 30 miles an hour. The trains will be run at first on a 2½ minute headway. In order to obtain these speeds with the smallest expenditure of cost, an interesting expedient has been resorted to in the construction of the tunnels. Instead of building it on a level or with constant grades from station to station, the separate tunnels which carry the tracks are run in a series of dips. The train upon leaving a station will immediately start down an incline, so that gravity shall add to the acceleration of its speed. When it approaches a station it will run up-grade, which will stop it with little use of the brakes. Each train without the locomotive will weigh 105 long tons and with the locomotive 147 long tons, but with the dipping tracks only 100 horse power will be needed for each train.

A METAL RUST PREVENTIVE OF 1402.

In an entertaining but little known book, entitled "Sir John Hawkwood," by John Temple-Leader and Giuseppe Marcotti, we find the following receipt for a metal polish and anti-rust: "Cut off all the legs of a goat from the knee downward, let them stay in the smoke for a day, then keep them fifteen or twenty-five days. When you require them, break the legs and take out the marrow from the bones and grease the arms (armor) with it, and they will always keep bright, even when wet."

Those of us who are fortunate enough to possess any armor find that vaseline is equally effective. It is not very generally known that one of the most famous captains of mercenary troops in Italy, in the fourteenth century, was an Englishman, Sir John Hawkwood.

* Abstract of two lectures delivered before the Franklin Institute, Philadelphia, by F. H. Newell, Hydrographer to the United States Geological Survey.